THE SURGERY OF
THE ANUS ANAL CANAL AND RECTUM

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BY

E S R HUGHES

M D (Melbourne) M S (Melbourne) F R C S (England) F R A C S
Surgeon to Out Patients The Royal Melbourne Hospital
Melbourne Australia

FOREWORD BY

C NAUNTON MORGAN M S F R C S

Surgeon St Bartholomew s Hospital Surgeon St Mark s Hospital for Diseases of the Rectum and Colon London Surgeon Royal Masonic Hospital Consulting Surgeon Hospital for Tropical Diseases Consulting Surgeon Royal Air Force Consulting Surgeon (Proctology) Royal Navy and Army



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Dr. Cuthbert Dukes, O.B.E., M.Sc.(Lond.), M.D.(Edin.), F.R.C.S.(Eng.), D.P.H.(Lond.), Pathologist and Director of Research Laboratories, St. Mark's Hospital, London

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To
Alison
Jennifer
Gordon and
Ann

## FOREWORD

I AM indeed privileged to be invited to write the foreword to this book on the Surgery of the Anus Anal Canal and Rectum by my friend E S R Hughes of Melbourne because there are so few modern British works dealing with this branch of Surgery

This book conceived in the Southern Hemisphere by a general surgeon is a notable addition to the literature of rectal surgery

The author a former Resident Surgical Officer at St Mark s Hospital reflects the teaching and inspiration of this Mecca of colon and rectal surgery He has faithfully followed the footsteps of another Australian Campbell Milligan Consulting Surgeon to St Mark s Hospital whose pains taking anatomical researches in this field have been the basis for much of the advancement in our knowledge and in the treatment of the more common ano-rectal diseases

The book is up to date concise full of practical facts free from verbosity and garnished by historical illustrations It is not merely a reproduction of material already in print but contains the carefully considered views of its author

Mr Hughes from his experience in the treatment by skin cover of wounds of the perianal region following operation has reminded us of the value of this procedure with its obvious economic and other advantages This method has been made possible by the use of sulphonamides and anti biotics and advances in surgical technique

The line drawings and general arrangement of the text make for clarity and ease in finding the important and salient facts Not only the practising surgeon but also the general practitioner and the medical student will find this book of value and I am confident that the labours of the author will be well rewarded

149 Harley Street
London W 1

# PREFACE

THIS book is not intended as a work of reference as I have neither the desire nor the ability to compete with authors who have made valuable contributions of this nature Here I describe theory and practice in the surgery of the anus anal canal and rectum which I have found to be adequate

To become a specialist the practitioner must pass through three phases In the first he must be inspired to take a particular interest in the specialty in the second he must receive special training in that work and in the third he must have full facilities to practise his art to allow him to develop his skill

I am indebted to Mr John Turner F R C S Surgeon to In Patients at the Royal Melbourne Hospital for supplying the inspiration to specialise in proctology Mr Turner worked under the great W E Miles and when he returned to Melbourne built up an extensive practice in which were a very large number of patients suffering from ano-rectal disorders This experience gave Mr Turner an authoritative position in proctology in Australia it was the perfection of his teaching which so impressed me In later years he shared with me his interesting problems in a most unselfish manner

My training in the specialty was obtained I am proud to say at St Mark s Hospital for Diseases of the Rectum London Firstly I was a clinical assistant to Mr E T C Milligan and later Resident Surgical Officer This hospital provides unique special experience partly because of the large numbers of patients seen but chiefly because of the stimulating teaching and leadership of the staff I acknowledge with gratitude the work of Dr Cuthbert Dukes Mr W B Gabriel Mr E T C Milligan Mr Naunton Morgan Mr O V Lloyd Davies Mr J C Goligher and Mr Henry Thompson

Since I returned to Melbourne I have been fortunate indeed in having the co-operation and goodwill of many doctors which has provided me with every opportunity to continue my study in this specialty Very generously a number of my senior colleagues at the Royal Melbourne Hospital have made available facilities for the treatment of certain of their patients suffering from unusual proctological conditions and my special thanks are due to Sir Victor Hurley Sir Albert Coates Mr W D G Upjohn Mr Orm Smith Mr G R A Syme and Mr Grayton Brown In developing operative technique I have been lucky in having assistance and helpful criticism from a number of first-class registrars and house surgeons in particular I would like to mention Mr R Kernutt Mr H Stanistreet Mr Kenneth Cox and Mr A R Waterhouse

In arranging the subject matter of the book I have followed the orthodox method of classifying disorders into separate sections This is applicable in

this region because as a rule the diagnosis can be made by clinical examination I have not included chapters on trauma or on congenital abnormalities because my personal experience is limited

This book would have taken much longer to prepare if it had not been for the tireless energy of my secretary Miss Jean Lister She has spent many long evenings and week-ends typing and re typing the manuscript The final copy was a beautiful piece of work She also was responsible for gleaning the information in the Historical Appendix and for much other and considerable help

I have done the drawings myself and have received every co-operation from the Department of Visual Aids University of Melbourne in photographing the drawings as they were completed Most of the photographs were also my own work and it is a pleasure to acknowledge the assistance I have had from the theatre staffs of the Royal Melbourne Hospital St Andrew s Presbyterian Hospital (Sister Johnson) and Bethesda Salvation Army Hospital (Sister Stewart) Most of the pathological specimens have been photographed by Mr Inglis of the Department of Medical Illustration the Royal Melbourne Hospital to whom my thanks are due whilst Dr J D Hicks very kindly supplied the photomicrographs

The *Australian and New Zealand Journal of Surgery* the *Medical Journal of Australia* the *British Journal of Surgery* and the *British Medical Journal* have very kindly granted permission to reproduce illustrations from my articles which have appeared from time to time

I wish also to express my sincere thanks to the following for permission to use illustrations

The *Australian and New Zealand Journal of Surgery* (Freidin 1955) for Figure 22 The University of Leiden Holland for Figure 35 The Wellcome Historical Medical Museum for Figure 40 The British Museum for Figures 81 A and 126 *La Press Medicale* for Figure 127 Messrs G Bell & Sons Ltd London for Figure 273 which is taken from *Rest and Pain* (1950) edited by E W Walls and E E Philipp Messrs Hutchison & Co Ltd London for Figure 274 which is original to *Disciples of Aesculapius* (1900) by Sir B W Richardson Messrs W B Saunders Co London and Philadelphia for Figure 275 which appears in *An Introduction to the History of Medicine* (1929) by F H Garrison *The Lancet* and the Anthony Buckley Studios Ltd for Figure 276

The manuscript has been read for me by several friends Dr Gordon Houseman Dr D G McLeish Dr A R Waterhouse and Miss Barbara Stubbs receive my special thanks for this work Dr Ian Wood and Professor E S J King have always been generous in their help in these matters and in the preparation of this book I was able to take full advantage of their experience Professor Maurice Ewing Professor of Surgery in the University of Melbourne very kindly gave me some valuable advice

I am indebted to the publishers Messrs E & S Livingstone Edinburgh for the excellent way in which they have produced this work it is a special pleasure to record my personal sincere thanks to Mr Charles Macmillan Managing Director and to Mr James Parker Director

E S R HUGHES

Melbourne Australia
1957

# CONTENTS


| Chapter | | Page |
|---|---|---|
| I | Surgical Anatomy of the Anal Canal and Rectum | 1 |
| II | The Symptoms of Ano-Rectal Disease | 22 |
| III | The Investigation of Ano-Rectal Disease | 26 |
| IV | Surgical Wounds of the Anal Region | 42 |
| V | Anaesthesia for Ano-Rectal Surgery | 50 |
| VI | Ano-Rectal Suppuration | 55 |
| VII | Anal Fistula (Fistula in Ano) | 68 |
| VIII | Sinuses Related to the Anus | 104 |
| IX | Anal Fissure (Fissure in Ano) | 114 |
| X | Haemorrhoids | 127 |
| XI | Prolapse of the Rectum | 154 |
| XII | Pruritus Ani | 172 |
| XIII | Proctitis (Non Specific) | 180 |
| XIV | Benign Tumours of the Rectum | 187 |
| XV | Carcinoma of the Rectum | 202 |
| XVI | Squamous Cell Carcinoma of the Anus and Anal Canal | 277 |
| | Historical Appendix | 287 |
| | Index | 295 |

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# CONTENTS


| Chapter | | Page |
|---|---|---|
| I | Surgical Anatomy of the Anal Canal and Rectum | 1 |
| II | The Symptoms of Ano Rectal Disease | 22 |
| III | The Investigation of Ano Rectal Disease | 26 |
| IV | Surgical Wounds of the Anal Region | 42 |
| V | Anaesthesia for Ano-Rectal Surgery | 50 |
| VI | Ano-Rectal Suppuration | 55 |
| VII | Anal Fistula (Fistula in Ano) | 68 |
| VIII | Sinuses Related to the Anus | 104 |
| IX | Anal Fissure (Fissure in Ano) | 114 |
| X | Haemorrhoids | 127 |
| XI | Prolapse of the Rectum | 154 |
| XII | Pruritus Ani | 172 |
| XIII | Proctitis (Non Specific) | 180 |
| XIV | Benign Tumours of the Rectum | 187 |
| XV | Carcinoma of the Rectum | 202 |
| XVI | Squamous Cell Carcinoma of the Anus and Anal Canal | 277 |
| | Historical Appendix | 287 |
| | Index | 295 |

*Chapter One*

# SURGICAL ANATOMY OF THE ANAL CANAL AND RECTUM

SOME aspects of the anatomy of the anal canal and rectum are more readily studied in the living. In this region therefore the anatomist seeks the aid of the surgeon who has both endoscopic examinations and surgical dissections with which to obtain anatomical information.

## THE ANUS, ANAL ORIFICE AND ANAL VERGE

The *anus* is set in the diamond shaped perineum and on or just behind the transverse line which joins the ischial tuberosities (Fig 1). The anus has

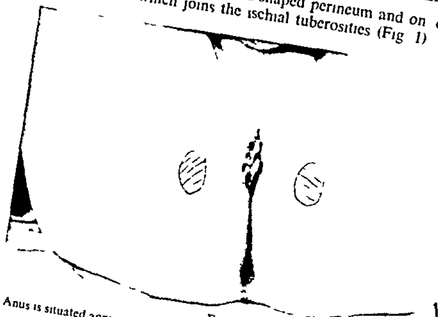



Fig 1

Anus is situated approximately on line joining anterior edges of ischial tuberosities (marked with skin pencil)

an antero posterior direction and lies in the natal cleft which may be deep or quite shallow. From the centre of the closed anus radiate folds of pigmented skin smooth and free from skin tags. the anus is greatly stretched at defaecation and the folds disappear but they reappear with closure of the anus on account of contraction and elasticity of the corrugator cutis ani muscle (Fig 2).

The anus is normally closed and remains so even when the patient is deeply anaesthetised. In suitable subjects lateral traction at the anal margins opens the anus widely to reveal the *anal orifice* leading into the anal canal. The edge of the anal orifice is known as the *anal verge* and it is from this


1

relatively constant level that sigmoidoscopic measurements should be made rather than from the variable level presented by the buttock



FIG 2
Normal anus showing anal orifice anal verge and radiating folds of skin

## THE ANAL CANAL

The anal canal extends from the anus to the ano-rectal ring and is about three to four centimetres in length The ano-rectal ring is a strong muscular ring formed by various muscles and represents the upper end of the muscular sphincters which guard the lower end of the large bowel The ano-rectal ring is not an embryological boundary and may not be acceptable to the anatomist whose material is formalin hardened but nevertheless it is a structure which is easily recognised on clinical examination and it possesses considerable clinical significance The pectinate line represents the upper limit of the *anatomical anal canal* and the ano-rectal ring the upper limit of the *surgical anal canal* (Fig 3)

### The Mucous Membrane of the Anal Canal

The mucous membrane of the upper half of the surgical anal canal has a pink colour in the lower half it is plum coloured changing to bluish purple just inside the anal verge The mucous membrane is lined by columnar and cuboidal epithelium and is arranged in longitudinal folds known as the *columns of Morgagni* (Fig 4) these columns are joined at their lower ends by delicate semilunar folds known as the *anal valves* The small pockets between the columns and just above the anal valves are known as the *crypts of Morgagni* The columns of Morgagni probably possess no special significance other than representing a mechanism whereby the mucous membrane can accommodate considerable stretching in the course of defaecation The anal valves are believed to be the level of the embryological junction of the post allantoic gut and

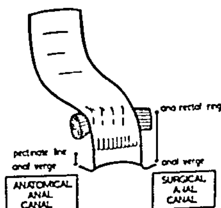



FIG 3
Difference between anatomical and surgical anal canal

the proctodael ingrowth and correspond roughly to the transition from glandular to stratified epithelium It has been suggested that the crypts of Morgagni are concerned with the lubrication of the anal canal but this is doubtful

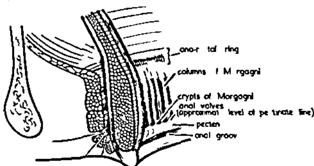



FIG 4
Anatomical structures in anal canal

The *pectinate* line is the name given to the level at which typical rectal mucosa changes to the stratified epithelium of the anal skin As mentioned above this transition is at about the level of the anal valves but may be a little above it In some individuals *papillae* develop from the tips of the faces of the pectineal indentations and these project into the lumen of the anal canal These anal papillae do not arise from the valves (Fig 5)

A constant feature of the living anal canal is the presence of a groove five to ten millimetres in width extending around the anal canal just within the anal verge (Fig 4) It is difficult to identify this groove after the anal

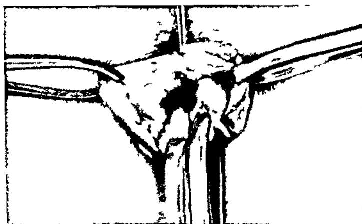


FIG 5
Hypertrophy of anal papillae

canal has been removed A few millimetres above the groove are the anal valves and pectinate line This groove separates the internal from the external haemorrhoidal zones and corresponds roughly with the band referred to as the *pecten* Stroud used this term to define the narrow area bounded by the pectinate line above and Hilton s white line below Ewing (1954) has recommended that the latter term be discarded because it is so unusual to see a white line in the anal canal This *anal groove* or pecten is covered

by stratified epithelium and has a dense connective tissue matrix with thick muscular and elastic components suggesting firm support and anchorage of the mucous membrane, it forms a contrast to the mucous membrane of the upper half of the anal canal which is supported by lax areolar tissue and thin and regular mucous membrane

A *special series of anal glands* opens into the crypts of Morgagni (Fig 6) There are rarely more than six or eight of these glands in the human but they appear to be a constant feature and are most concentrated in the posterior segment of the anal canal They arise *only from* the narrow transitional circular zone in which the rectal mucosa changes from columnar to stratified

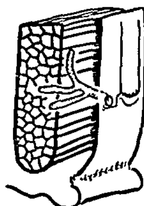


Fig 6

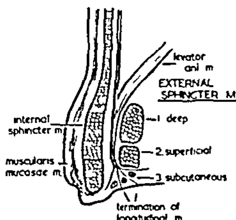



Fig 7

Fig 6 Anal gland

Fig 7 Components of musculature of anal sphincter Diagram represents average finding in twenty three dissected specimens

epithelium *An anal gland possesses a narrow duct and up to six tubular* branches which extend into the submucosa nearly always in a direction towards the anus (Walls 1956) These glands have been traced into the internal sphincter and occasionally have been seen penetrating the longitudinal muscle They were formerly regarded as morphological rudiments but more recent *investigations suggest some definite function and* in the lower animals at least it is thought that the glands are connected with sexual activities and that they secrete odoriferous substances

## The Musculature of the Anal Canal (Figs 7 8 9 10)

The anal canal is surrounded by a *complicated sphincter* whose muscle structure has been the subject of many investigations There are both voluntary and involuntary muscle components with smoothly co-ordinated *function*

External Sphincter Muscle —*This muscle is composed of three parts* although fusion of adjacent portions of the muscles makes the subdivision artificial

1 *Subcutaneous External Sphincter Muscle*—This portion of the external sphincter overlaps the internal sphincter muscle but not to such an extent as to form the lower part of the anal canal (Figs 7 8 9) The muscle is a

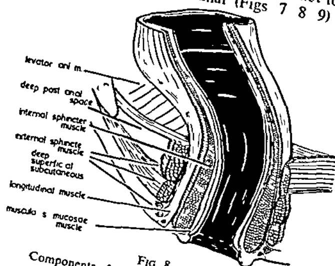



Fig 8
Components of musculature of anal sphincter

relatively thin red band encircling the anal canal The subcutaneous sphincter is separated into fasciculi by prolongations of the longitudinal muscle passing towards the skin This muscle is only occasionally identified in the course of operations on the anal canal (Goligher Leacock and Brossy 1955 Hughes 1956)

2 *Superficial External Sphincter Muscle*—This portion of the external sphincter muscle is elliptical in shape and lies above and is a little more lateral than the subcutaneous part The superficial part is incompletely separated from the subcutaneous part by an extension of the longitudinal muscle termed the perianal fascia by Milligan and Morgan The superficial external sphincter muscle is attached to the dorsal aspect of the coccyx in fact it is the only part of the external sphincter muscle which gains insertion into this bone It also has some fibres passing to the skin over the coccyx As it passes forwards the muscle splits towards the central point of the perineum (Figs 8 9)

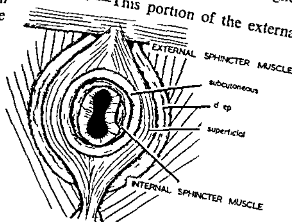



Fig 9
Musculature of anal sphincter

3 *Deep External Sphincter Muscle*—This is the upper division of the external sphincter muscle Posteriorly the uppermost fibres intermingle with

those of the pubo-rectalis portion of the levator ani muscle (Figs 8 9) Anteriorly the fibres of the muscle decussate and join with the transverse perineal muscles and also merge with extensions from the pubococcygeus muscle which fuse with one another in front of the rectum (Luschka s muscle)

INTERNAL SPHINCTER MUSCLE —The internal sphincter muscle is a direct continuation of the circular coat of the large bowel (Figs 7 8) It is thirty to thirty five millimetres in length and five to seven millimetres in width The

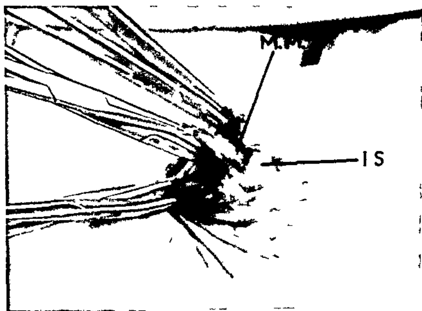



FIG 10
Lower border of internal sphincter muscle (I.S) and muscularis mucosa (M M) exposed during operation for internal haemorrhoids

muscle is sharply delineated bounded on the outer side by a continuation of the longitudinal muscle and on the inner side by the muscularis mucosae which is also well-defined at this level Extensions of these two longitudinal muscle layers intermingle around the lower border of the internal sphincter muscle The pale compact fibres of the internal sphincter muscle are traversed by thin sheets of tissue passing from the outer longitudinal coat to the inner muscularis mucosae Because it extends to the anal verge the lower edge of this well-developed muscle has been confused with the subcutaneous portion of the external sphincter muscle (Fig 10)

LONGITUDINAL MUSCLE —The longitudinal muscle is reinforced by fibres received from the levator ani muscle but as this conjoint muscle proceeds distally the muscle fibres are replaced by fibro-elastic tissue (Figs 7 8) Thin sheets and bundles separate off medially and pierce the internal sphincter muscle to join with the muscularis mucosae

At the level of the lower border of the internal sphincter muscle the longitudinal muscle splits up into numerous sheets (or bundles) which pass

through the subcutaneous portion of the external sphincter muscle dividing it into fasciculi and finally merging with the dermis of the skin

One of these prolongations of the longitudinal muscle passes between the lower border of the internal sphincter muscle and the subcutaneous external sphincter muscle and has been termed the *anal intermuscular septum* but apart from its situation there is nothing to distinguish it from the other terminal sheets of the muscle

MUSCULARIS MUCOSAE MUSCLE —As the muscularis mucosae proceeds distally it receives reinforcing strands from the longitudinal muscle coat which pierce the internal sphincter muscle The muscularis mucosae becomes a well-defined structure and reaches maximum development in the region of the anal valves and continues in this way to the lower border of the internal sphincter (Figs 7 8) At this level many of the fibres are attached to the epithelial layers and appear responsible for the groove attributed by Milligan and Morgan to the attachment of the anal intermuscular septum Some fibres continue distally immediately under the skin of the anus to form the *corrugator cutis ani muscle* The more laterally placed fibres mingle around the lower border of the internal sphincter with the inner septa of the longitudinal muscle (Fig 10)

The muscularis mucosae muscle is so well-developed that it has been given a special name by various investigators Kohlrausch in 1854 suggested the term muscularis mucosae ani The muscularis mucosae muscle forms the dense matrix of the pecten zone of the anal canal

CORRUGATOR CUTIS ANI MUSCLE —This term was given by Ellis (1878) to a thin layer of involuntary muscle in the subcutaneous tissue and extending outwards from the anus This muscle is almost certainly derived from a continuation of the muscularis mucosae muscle and is responsible for the characteristic puckering of the skin of the closed anus (Fig 2)

## THE RECTUM

The rectum is the lowermost portion of the colon it extends from the recto sigmoid junction to the ano rectal ring The latter is a fixed level and is easily recognised The recto sigmoid junction however is not marked by muscular sphincters and is difficult to define

The endoscopist finds that after passing the sigmoidoscope approximately fifteen centimetres from the anus he encounters a zone a short distance above the upper valve of Houston beyond which it is difficult to negotiate it almost seems that there is a narrowing of the bowel at this site To the endoscopist therefore the recto sigmoid junction is about fifteen centimetres from the anus (Fig 11)

The surgeon tends to regard tumours of the bowel situated as high as the promontory of the sacrum as recto-sigmoid in situation whilst anatomists place the recto-sigmoid junction opposite the third piece of the sacrum *Here*

*the rectum is considered to end at about fifteen centimetres from the anus on sigmoidoscopy and at the third piece of the sacrum at operation the two levels correspond roughly*

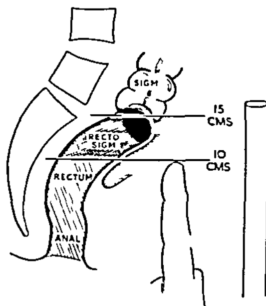



FIG 11
The finger reaches a level ten centimetres from anus An important function of the sigmoidoscope is to reach lesions situated in a radiologically blind zone situated between ten centimetres and fifteen centimetres from anus

The rectum follows the curve of the sacrum Gorsch (1955) points out that the posterior wall in contrast to the straighter anterior wall curves abruptly forwards over the ano-coccygeal raphe this is responsible for a 'blind spot' in the rectum in the course of endoscopy The rectum also possesses lateral flexures corresponding with the rectal valves of Houston *there are usually two flexures on the right and one on the left* At the ano-rectal ring the lumen of the bowel curves sharply so that whilst the lower third of the rectum is directed downwards and forwards the anal canal proceeds downwards and backwards

The rectum has a wide easily distensible lumen The mucosa lined by columnar epithelium is pink and vessels large and small can be seen in the submucosa this is known as the vascular pattern and is lost in certain pathological conditions wherein the mucosa becomes abnormally thickened

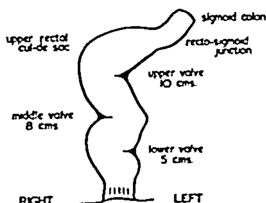



FIG 12
Valves of Houston

Three folds project into the lumen of the rectum They were well described by Houston in 1830 and are referred to as the *rectal valves of Houston* Although there are usually three such valves they may be absent altogether or there may be as many as five The lowest of these valves is just above the ano-rectal ring and about five centimetres from the anal verge as measured on the sigmoidoscope (Fig 12) It is situated in the left posterior quadrant The middle valve is usually the most prominent and is sometimes called Kohlrausch's plica it projects into the lumen from the right or right anterior aspect of the anus This valve is about seven to eight centimetres from the

anus and corresponds very approximately to the level of reflection of the peritoneum off the anterior wall of the rectum Tumours below this valve lie in the lower half or extra peritoneal portion of the rectum which has some prognostic significance The third and uppermost valve of Houston is about ten centimetres from the anal verge and is situated on the left side Immediately above this level is a cul-de sac and above this again the relatively narrow sigmoid colon The rectal valves of Houston contain extensions from both muscle coats and fibrous connective tissue They are not present in all mammals and their function is not clear It was once thought that chronic constipation might be caused by prominent Houston s valves and instruments were designed to reduce their size by pressure necrosis

## LEVATOR ANI MUSCLE

(Fig 13)

The levator ani muscle is intimately related to the rectum and anal canal It is doubtful if the levator ani has any important role in support of viscera other than the anal canal and rectum because it is largely excised with the rectum and anal canal in radical surgery for carcinoma and complications rarely follow The levator ani muscle consists of two main parts the *ilio-coccygeus* and the *pubo-coccygeus* the latter has a specialised portion referred to as the *pubo rectalis*

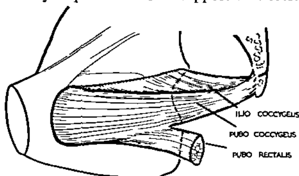



Fig 13
Levator ani muscle

**Ilio coccygeus Muscle**

This portion arises from the ischial spine and from the lateral pelvic wall as far forwards as the obturator canal Its origin is fascial and the whole muscle is usually thin and degenerate although it may hypertrophy quite considerably during pregnancy The muscle fibres pass downwards and inwards to gain insertion into the sides of the coccyx and ano-coccygeal raphe

**Pubo coccygeus Muscle**

This portion of the levator ani muscle arises from the posterior aspect of the pubis the deep layer of the triangular ligament and from the fascial arch or white line of the levator ani muscle The fibres pass mainly backwards and slightly inwards and on either side of the visceral canal to join in a V shaped manner to form a raphe attached to the front of the coccyx and lower sacrum The muscle fibres of the pubo-coccygeus run in a different direction from those of the ilio-coccygeus the former run backwards and

the latter downwards and inwards this difference is partly due to the more posterior origin of the ilio-coccygeus and partly to the obliquity of the pelvis

In its medial and anterior portion the pubo-coccygeus is thicker and more vascular than the remainder of the muscle and forms the *pubo-rectalis muscle* At its origin the pubo-rectalis lies nearly horizontal with an upper and lower surface but as it passes backwards it appears to twist so that its upper edge now becomes medial and its medial edge inferior The pubo-rectalis fuses with that of the opposite side to form a continuous sling passing behind *the ano rectal junction* This *U* shaped muscle forms with the pelvic arch anteriorly the *pelvic aperture* four centimetres long and two and a half centimetres wide The pubo-rectalis has an important sphincteric action when it contracts it increases the ano-rectal angulation and narrows the pelvic aperture

## RECTO URETHRALIS MUSCLE

(Fig 14)

The recto-urethralis muscle is a band of smooth muscle continuous with the longitudinal coat of the rectum and extending forwards to the apex of the prostate and deep triangular ligament The muscle is intimately related to the fascia of Denonvilliers and must be divided to enter the correct plane in the course of excision of the rectum

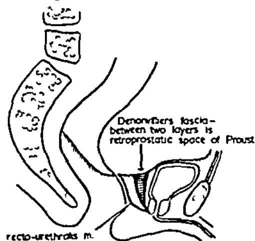


Fig 14
Denonvilliers fascia and recto urethralis muscle

## SPACES IN RELATION TO THE ANAL CANAL AND RECTUM

In close relation to the anal canal and rectum are certain anatomical spaces *of considerable clinical significance*

### 1 Submucous Space (Fig 15)

The submucous space *lies between* the mucous membrane and the internal sphincter inferiorly it ends at the level of the lower edge of the internal sphincter muscle in the dense matrix deep to the anal groove whilst superiorly it is continuous above the ano-rectal ring with the submucosa of the rectum It contains the internal haemorrhoidal plexus of vessels lymphatic vessels which tend to course up and down the space rather than form any arborising network as they do in the rectum and the well-developed muscularis mucosae muscle

### 2 Perianal Space (Fig 16)

The perianal space surrounds the anus It is limited above by the extension of the composite longitudinal muscle into the ischio-rectal fossa to form the

perianal fascia and nearer the anus by the termination of the muscularis mucosae muscle Inferiorly the space is bounded by the perianal skin and the corrugator ani muscle medially by the skin of the anus and the anal canal whilst on its outer aspect it becomes continuous with the sub cutaneous fat This space contains the subcutaneous external sphincter muscle and the external haemorrhoidal plexus of veins the latter communicates with the internal haemorrhoidal plexus by means of veins passing through the dense matrix of the anal groove The lower portion of the internal sphincter muscle extends into the space The fat of the perianal space is arranged in small compact locules and the vascular ity is apparent in operations involving this space such as haemorrhoidectomy

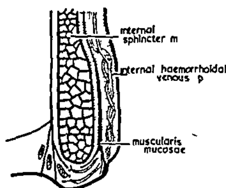



Fig 15
Submucous space

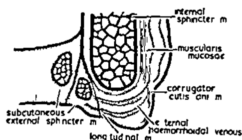



Fig 16
Perianal space

**3 Ischio rectal Space** (Figs 17 88 89)

The ischio-rectal fossa is divided into the perianal and ischio rectal spaces by the perianal fascia which extends laterally from its origin in the composite longitudinal muscle towards the ischial tuberosity In contrast to the closely packed and finely granular fat of the perianal space that of the ischio rectal space is in the form of large locules and is relatively avascular

The ischio rectal space is wedge shaped lying antero posteriorly with the apex forwards The base of the wedge is directed backwards as well as downwards here the ischio rectal space is broadest and is partly over lapped by gluteus maximus muscle and limited by the perianal space and skin The apex of the wedge is situated above the triangular ligament between the side of the pelvic aperture and the descending pubic ramus The floor of

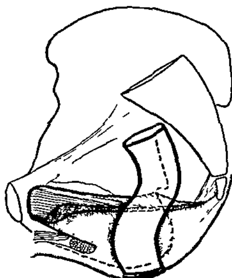


Fig 17
Ischio rectal fossa Apex of this pyra midal shaped fossa situated anteriorly and extends above triangular ligament base situated postero inferiorly

the space posteriorly is formed by perianal fascia which separates it from perianal space the triangular ligament and the perineal muscles form a shelf below the anterior extension of the ischio-rectal space

The inner wall of the ischio-rectal space is formed by the pubo-coccygeus and pubo-rectalis muscles together with the two deeper portions of the external sphincter muscle Posteriorly and behind the anus the inner wall disappears and the ischio rectal spaces communicate between the ano-coccygeal raphe of the levator ani muscle and the coccygeal attachment of the superficial part of the external sphincter muscle This space has been termed the deep post anal space (or posterior communicating space) by Gorsch (Fig 8)

The outer wall of the ischio-rectal space is limited by the obturator fascia covering its muscle and by a small portion of the inner aspect of the ischium which lies below the falciform attachment of the sacro-tuberous ligament

The roof is arched and is formed by the fibres of the levator ani muscle as they pass inwards towards their insertion The roof is broadest in the posterior part of the space and becomes narrow anteriorly above the triangular ligament At the apex the inner wall and roof merge with one another because the ilio-coccygeus and pubo-coccygeus muscles are in apposition at their origins from the white line The outer wall and floor also approach the inner wall and roof at this point Some anatomists have described the presence of a layer the *lamina terminalis* passing across the ischio-rectal space from its inner to outer walls at the base of the triangular ligament this would limit the ischio rectal space to the level of the base of the triangular ligament but such exclusion of the anterior extension of the space has not been supported by clinical observation and operative findings in cases of infection in the ischio-rectal fossa

## RECTOGENITAL SEPTUM

(Fig 14)

Separating the rectum from the prostate and seminal vesicles in the male and from the vagina in the female is a well-defined fascial septum known as *Denonvilliers fascia* Some investigators believe this fascia is derived from the peritoneum but others favour a strictly fascial origin

In the male the septum is nearly always clearly demarcated and is composed of anterior and posterior layers the anterior layer is intimately related to the posterior capsule of the prostate whilst the posterior layer extends to the apex of the prostate and deep triangular ligament in close association with the recto-urethralis muscle The potential space between the two fascial layers is filled with loose areolar tissue and is known as the *retroprostatic space of Proust* The rectogenital septum is attached above to the peritoneal pelvic pouch whilst laterally it extends across the pelvis In the male the two layers of the septum are so well-defined that when separated they present the appearance of a serous surface in the female this is less apparent The septum and the potential space between the two layers which form it are very important in the surgery of carcinoma of the rectum

## BLOOD SUPPLY OF THE ANAL CANAL AND RECTUM

(Figs 18 19)

### 1 Superior Haemorrhoidal Artery

The superior haemorrhoidal artery is a continuation of the inferior mesenteric artery which arises from the abdominal aorta opposite the third lumbar vertebra four centimetres from the bifurcation of the aorta and seven centimetres above the prominence of the sacrum

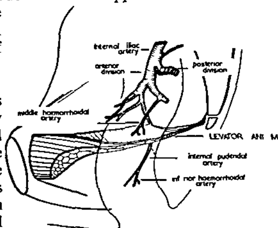



Fig 18
Blood supply of rectum

The inferior mesenteric artery surrounded by lymphatic channels and glands and enveloped by fatty tissue descends over the terminal portion of the aorta and over the prominence of the sacrum For the first seven to eight centimetres of its course it lies behind the peritoneum covering the posterior abdominal wall but more distally it enters the base of the mesentery of the lower sigmoid colon recto sigmoid junction and upper rectum in the meso rectum it becomes the superior haemorrhoidal artery and divides into its terminal branches which are closely applied to the middle third of the rectum before finally disappearing into the wall of the lowest part of the rectum The artery and its branches supply the rectum and the anal canal as far as the anal groove Pulsations of the terminal arteries can be felt in the pedicles of the internal haemorrhoids when these are large

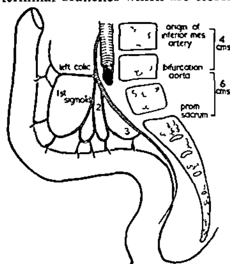



Fig 19
Inferior mesenteric artery

Apart from the terminal branches the inferior mesenteric and superior haemorrhoidal arteries supply branches to the descending colon and the sigmoid colon These branches are important in the surgery for carcinoma of the rectum The left colic artery and the first sigmoidal artery arise conjointly in about fifty per cent of individuals * the conjoined origin is opposite the bifurcation of the aorta Sometimes the second sigmoid artery arises from the same origin In

* In this book the first branch of the inferior mesenteric artery is referred to as the left colic artery and the second as the first sigmoid artery

forty per cent of cases (Goligher 1949) the left colic artery is the first branch with the first sigmoid artery arising half to three-quarters of an inch below whilst in the remaining ten per cent the first sigmoid artery definitely arises from the left colic artery The left colic artery ascends almost directly upwards towards the splenic flexure There are usually two three or four sigmoidal branches but there may be as many as six The space in the mesentery between the left colic artery and the first sigmoidal artery is much larger than the mesenteric windows between the sigmoidal arteries

The left colic artery divides into branches as it approaches the colon to form an arcade with the descending branches of the middle colic artery the anastomosis is good and sufficient to supply the descending colon and sigmoid colon if the inferior mesenteric artery is ligated at the aorta (Goligher 1954) The left colic artery anastomoses distally with the first sigmoid artery with which it helps to form an arcade two to four centimetres from the sigmoid colon This arcade is carried on by the lower sigmoidal arteries The anastomosis between the lowest sigmoidal artery and the terminal branches of the superior haemorrhoidal artery is not so well-defined Sudeck (1907) observed gangrene in the upper rectum in two patients whose superior haemorrhoidal arteries had been ligated just distal to the last sigmoid arterial branch during perineal resection of the rectum He established the origin of the last sigmoid artery as a *critical point* for maintaining the blood supply of the rectum after ligating the superior haemorrhoidal artery (Fig 20) The superior haemorrhoidal artery has been regarded as the most important blood supply to the anal canal and rectum yet the artery can be ligated and the marginal vessels of the sigmoid colon removed without the anal canal or the rectum undergoing necrosis Viable bowel extends up to five centimetres above the peritoneal reflection and further if the anastomosis at Sudeck s point is adequate The blood supply in these circumstances is derived from the middle haemorrhoidal and inferior haemorrhoidal arteries

**2 Middle Haemorrhoidal Artery**

This vessel of varying size arises from the anterior trunk of the internal iliac artery or from one of its two main terminal vessels the inferior gluteal artery or the internal pudendal artery The vessel runs medially towards the rectum in association with veins and lymphatic vessels these vessels are surrounded by fibro-fatty connective tissue which constitutes the *lateral ligament of the rectum* The lateral ligament is situated above the upper surface of the levator ani from which it is separated by loose areolar tissue The ligament is divided during the course of an abdomino-perineal excision of the rectum and the contained artery is sometimes so small that no ligature for it is necessary The middle haemorrhoidal artery appears to be concerned mainly with supplying the muscles of the anal canal and rectum but must anastomose freely with the other arteries of the anal canal and rectum

Freidin (1955) observed that when the middle haemorrhoidal artery was present the terminal branches penetrate the rectum over an area which varies

from one to three square centimetres This zone extends from four centimetres to eight centimetres above the anal margin (Fig 22)

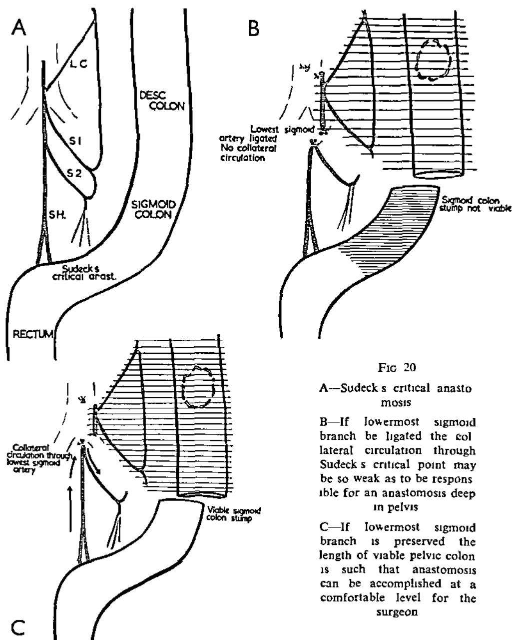



FIG 20

A—Sudeck s critical anastomosis

B—If lowermost sigmoid branch be ligated the collateral circulation through Sudeck s critical point may be so weak as to be responsible for an anastomosis deep in pelvis

C—If lowermost sigmoid branch is preserved the length of viable pelvic colon is such that anastomosis can be accomplished at a comfortable level for the surgeon

### 3 Inferior Haemorrhoidal Artery

The inferior haemorrhoidal artery is a branch of the internal pudendal artery and arises as this artery enters Alcock s canal It may be represented by two or three smaller vessels The artery crosses the ischio rectal space in

association with its veins and is distributed to the lower anal canal and perianal space It anastomoses freely with the superior and middle haemorrhoidal arteries The inferior haemorrhoidal artery is always encountered in the perineal dissection of an abdomino-perineal excision of the rectum and requires ligation

4 **Miscellaneous Vessels**

The middle sacral artery and some of the other branches of the internal iliac artery (e g the superior vesicular artery) and terminal branches of the internal pudendal artery may provide small branches to the anal canal and rectum which become evident to the surgeon when he excises the rectum for tumours

## VENOUS DRAINAGE OF THE ANAL CANAL AND RECTUM

There are two main groups of veins which drain the anal canal and rectum the inferior mesenteric vein which passes to the splenic vein and hence the portal vein to enter the liver and the middle and inferior haemorrhoidal veins which pass to the systemic veins and so to the inferior vena cava and the heart without entering the liver Nearly all blood borne secondary malignant deposits from a carcinoma of the rectum are found in the liver indicating that the inferior mesenteric vein is the most important draining the rectum

The tributaries of the inferior mesenteric vein accompany the branches of the superior haemorrhoidal artery the main venous trunk lies to the left side of the artery and is closely applied to it but opposite the level of the bifurcation of the aorta the two vessels separate and the interval between them gradually increases as the artery proceeds to the anterior aspect of the aorta and the vein to the splenic vein to the left of the aorta

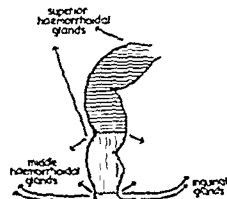



FIG 21
Lymphatic drainage of rectum

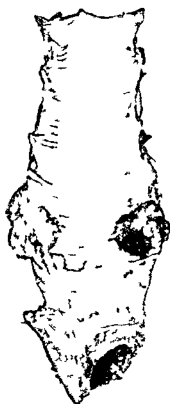
## LYMPHATIC DRAINAGE OF THE ANAL CANAL AND RECTUM

(FIGS 21 22)

The lymphatic vessels of the anal canal and rectum drain into the regional lymphatic glands There are three main sets of nodes those along the superior haemorrhoidal vessels those accompanying the middle haemorrhoidal vessels and those in the inguinal region There is free anastomosis between the various lymphatic plexus groups so accounting for such a phenomenon as the occasional appearance of malignant lymph nodes in the groin from primary tumours situated within the rectum and not apparently involving the anal verge

## 1 Superior Haemorrhoidal Lymph Glands

The lymph vessels and nodes follow the course of the superior haemor rhoidal vessels A group of glands is situated just above the levator ani in the



A



B

FIG 2

A—Mucosal surface of speci men cut anteriorly showing bisected tumour (Mr P R aged 58 years Combined ex cision on 28th April 1952 Four years later well and without sign of recurrence)

B—Posterior aspect of speci men to show dissected vessels

region of the ampulla of the rectum and in very close relation to the rectal wall these are known as the pararectal lymph glands (Gerota s nodes) Larger glands are situated around the bifurcation of the superior haemorrhoidal vessels at about the level of the third piece of the sacrum and further glands are found at the origins of the sigmoidal vessels from the superior haemor rhoidal artery Some of these nodes receive their lymph direct from the lower rectum by afferent channels by passing the nodes at a lower level so that these

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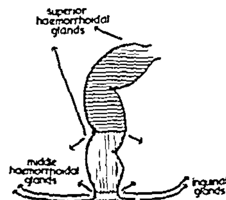



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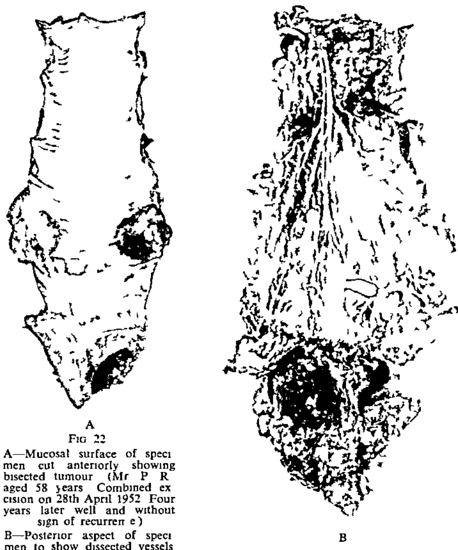
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upper glands are occasionally involved by malignant disease when the lower ones may be free The uppermost glands are grouped around the origin of the inferior mesenteric artery from the aorta the frequency of their involve

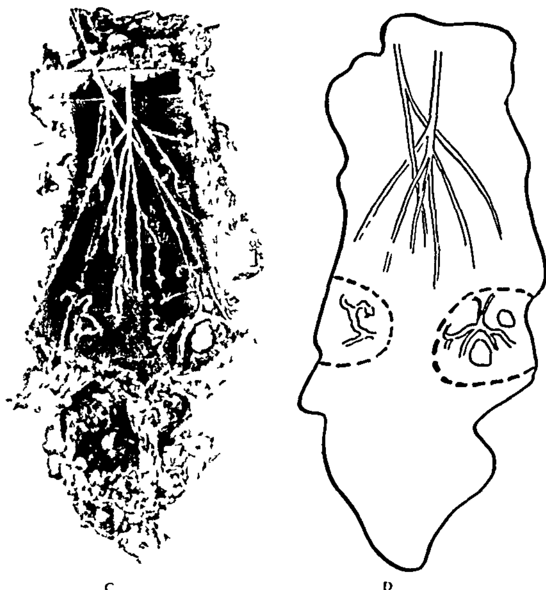



FIG 22 (cont)
C Posterior aspect of specimen to show dissected vessels with dark background introduced between vessels and muscle coat Note separate vessels in lateral ligaments with related glands
D – Scheme of dissection of vessels with nodes in right lateral ligament

ment in carcinoma of the rectum is uncertain but their removal presents no technical difficulties if the inferior mesenteric artery is ligated at its origin from the aorta

**2 Middle Haemorrhoidal Lymph Glands**

Lymphatic channels and often recognisable glands accompany the middle haemorrhoidal vessels in the lateral ligaments of the rectum their importance has been re-emphasised recently by several independent observers These glands are difficult to recognise at operation because of their depth in the pelvis and there has been a tendency for the surgeon to overlook their significance indeed in cancer surgery much emphasis has been placed on wide excision of the levator ani and with comparative neglect of the lateral ligaments (Sauer and Bacon 1952) In an excellent and painstaking study conducted in the Pathology Department of the University of Melbourne Freidin (1955) demonstrated the frequency with which lymph nodes in the lateral ligaments are involved when a carcinoma is situated in the lower part of the rectum (Fig 22) From the glands in the lateral ligaments channels pass into the lymph nodes which accompany the internal iliac vessels

**3 Inguinal Lymph Glands**

The lymphatics of the anus anal verge and lowermost portion of the anal canal collect into trunks which follow the perineo scrotal and perineo labial folds and end in the inguinal nodes Efferent vessels from these nodes drain into the glands along the external iliac vessels

## NERVE SUPPLY OF THE ANAL CANAL AND RECTUM

(Fig 23)

The nerve supply is derived from the sympathetic and parasympathetic systems and from the third fourth and fifth sacral nerves and from coccygeal filaments

According to Gask and Ross (1937) the *sympathetic fibres* originate in the lower thoracic and upper two lumbar segments of the spinal cord and pass via the thoracic and lumbar sympathetic chain and splanchnic nerves to join the aortic plexus Some fibres then proceed along the presacral nerve this divides into right and left branches which combine with the parasympathetic branches from the second third and fourth sacral segments to form the pelvic plexuses and supply the pelvic organs Other fibres pass from the aortic plexus to the inferior mesenteric plexus which accompanies the inferior mesenteric artery and is distributed along with the branches of that vessel

The *parasympathetic supply* comes from the second third and fourth segments of the cord some fibres proceed direct to the pelvic plexuses and are distributed from these others as Telford and Stopford (1934) have shown form a trunk which passes upwards to join the inferior mesenteric plexus and are conveyed in its branches to the left half of the colon and rectum

The *inferior haemorrhoidal nerves* and branches of the pudendal nerves (S 2 3 4) cross the ischio rectal fossa with the corresponding vessels and supply the external sphincter muscle they also contain sensory fibres from

the skin and perhaps from the mucosa of the anal canal and lower rectum An *anterior sphincteric nerve* arises from the pudendal nerve just behind the posterior border of the triangular ligament and supplies the antero-lateral aspect of the sphincter muscle and adjacent skin The *perineal branch of the fourth sacral nerve* pierces the coccygeus muscle to supply the posterior aspect of the perianal skin and some minor twigs to the sphincter muscle *Coccygeal filaments* ramify in the skin anterior to the coccyx but do not reach the musculature

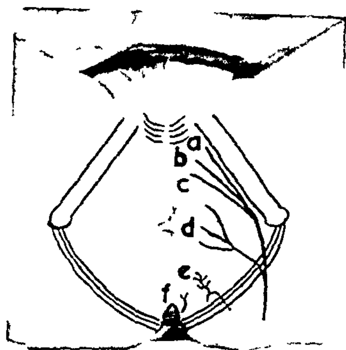



FIG 23
Perineal nerve supply
a—Pudendal nerve b—Perineal nerve c—Anterior sphincteric nerve d—Inferior haemorrhoidal nerve e—Fourth sacral nerve f—Anterior coccygeal nerves
(After G[illegible] (19[illegible]) Proct [illegible] An[illegible])

Experiments have been conducted in which the patient s sensations are recorded while the lower sigmoid colon and rectum are distended by inflation of a balloon introduced through a sigmoidoscope (Goligher and Hughes 1951)

Distension of the rectum within fifteen centimetres of the anus (occasionally only within ten centimetres or sometimes as high as twenty five centimetres) causes a sensation of fullness in the rectum giving the patient a desire to pass wind or a motion this is referred to as *rectal type of sensation* Distension above this level produces a purely abdominal sensation referred to the hypogastrium or left iliac fossa and this simulates a wind pain or intestinal colic this is referred to as *colonic type of sensation* Interruption of the nerve supply to the rectum and colon by anaesthetic block or by

operative division showed that the colonic type of sensation is mediated by the sympathetic and the rectal type by the parasympathetic system. Balloon distension causing rectal sensation evoked a contraction of the sphincteric mechanism of the anal canal which appeared to be partly reflex and partly voluntary. This was never produced by colonic distension (Goligher and Hughes 1951).

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## *Chapter Two*

# THE SYMPTOMS OF ANO RECTAL DISEASE

THE outstanding symptoms of ano-rectal disease are bleeding pain a lump discharge irritation and alteration of the bowel habit In most instances the diagnosis of ano-rectal disease can be made after clinical examination Radiological and pathological investigations are rarely helpful to the proctologist

## BLEEDING

The most common and the most alarming symptom is bleeding (Fig 24) Blood from a lesion at the anal verge such as an anal fissure is nearly always accompanied by severe pain The blood is small in quantity bright red in colour and is most often observed on the toilet paper Bleeding from

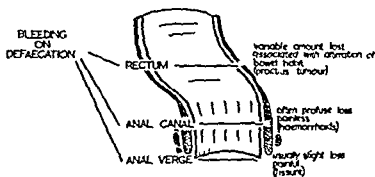



FIG 24
Common causes of bleeding from anal verge anal canal and rectum

first degree haemorrhoids tends to be profuse and blood may spurt or drip away quickly into the pan Bleeding and a mucous discharge are characteristic of a prolapsed third degree haemorrhoid and in such cases the patient is often unaware of the presence of a prolapsed haemorrhoid Bleeding from the rectum is not usually associated with anal discomfort and the blood is more often observed on the surface of the motions Lesions responsible for rectal bleeding may also cause an alteration of bowel habit but the combination of these symptoms is as common in benign conditions as it is in malignant

## PAIN

The mucosa of the rectum and upper anal canal is insensitive to ordinary stimuli and therefore lesions in this zone are relatively painless However lesions below the level of the anal valves are characteristically accompanied by severe pain Therefore the surgeon is able in most instances to diagnose the cause of a painful anus by inspection (Fig 25) Premature digital examination of the rectum must be resisted

Perianal and anal haematomas termed by Milligan the 'five-day painful self-curing lesions of the anus' are the most common painful lesions An anal fissure is almost as common Thrombosed internal haemorrhoids are acutely painful because of the associated engorgement and oedema of the perianal space A perianal abscess is extremely painful in contrast to the ischio rectal abscess where toxic symptoms are more in evidence Characteristically malignant lesions of the rectum are painless but the less common

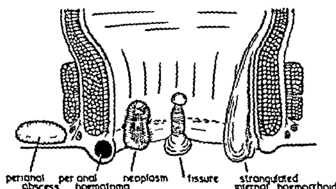



FIG 25
Common causes of pain in region of anus

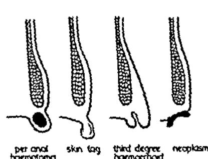



FIG 26
Common causes of a persistent lump in region of anus

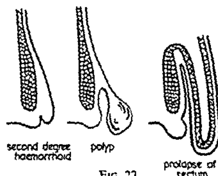



FIG 27
Common causes of a prolapsing lump at anus

*neoplasms of the anus may cause severe discomfort In a few cases* the pain is atypical and no cause can be found in such cases the condition is referred to as proctalgia fugax but this diagnosis should be made reluctantly

## A LUMP

Not uncommonly the patient is worried by the appearance of a lump in the anal region The lump may be persistent when it arises in the perianal tissues or it may be present intermittently appearing with the bowel actions *and sometimes between indicating an origin from within* the anal canal or rectum (Figs 26 27)

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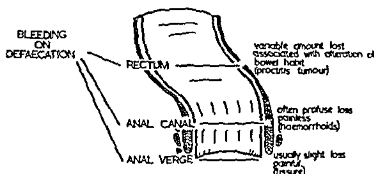



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## PAIN

The mucosa of the rectum and upper anal canal is insensitive to ordinary stimuli and therefore lesions in this zone are relatively painless However lesions below the level of the anal valves are characteristically accompanied by severe pain Therefore the surgeon is able in most instances to diagnose the cause of a painful anus by inspection (Fig 25) Premature digital examination of the rectum must be resisted

Perianal and anal haematomas termed by Milligan the five-day painful self-curing lesions of the anus are the most common painful lesions An anal fissure is almost as common Thrombosed internal haemorrhoids are acutely painful because of the associated engorgement and oedema of the perianal space A perianal abscess is extremely painful in contrast to the ischio rectal abscess where toxic symptoms are more in evidence Characteristically malignant lesions of the rectum are painless but the less common

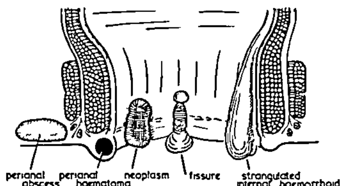



FIG 25
Common causes of pain in region of anus

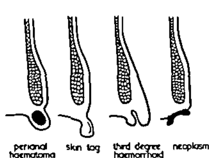



FIG 26
Common causes of a persistent lump in region of anus

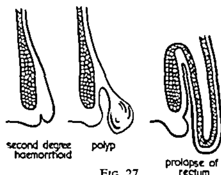



FIG 27
Common causes of a prolapsing lump at anus

neoplasms of the anus may cause severe discomfort In a few cases the pain is atypical and no cause can be found in such cases the condition is referred to as proctalgia fugax but this diagnosis should be made reluctantly

## A LUMP

Not uncommonly the patient is worried by the appearance of a lump in the anal region The lump may be persistent when it arises in the perianal tissues or it may be present intermittently appearing with the bowel actions and sometimes between indicating an origin from within the anal canal or rectum (Figs 26 27)

The most common of the persistent lumps are perianal haematomas skin tags and chronically prolapsed third degree haemorrhoids Tumours benign and malignant do occur in this region but are rare Intermittent lumps are usually internal haemorrhoids prolapsing with each act of defaecation and sometimes between returning spontaneously or after a push Fibrous polyps may form on the mucosa dragging the mucosa with them New growths may prolapse with defaecation even when situated in the rectum but mostly such tumours are benign in nature The uncommon complete prolapse of the rectum is responsible for a large ' lump ' in the perineum

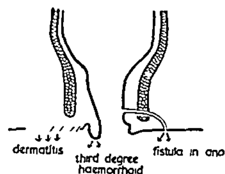



FIG 28
Common causes of discharge from anal region

## DISCHARGE

Discharge as the major symptom is suggestive of an anal fistula In such conditions the discharge is purulent usually slight but persisting for long periods It causes a perianal irritation (Fig 28)

A discharge is present when mucous membrane is prolapsed outside the anus *e g* chronically prolapsed third degree haemorrhoids The escaping mucus is responsible for persistent discomfort and soiled underwear

A serous discharge is characteristic of the weeping scaling skin of severe pruritus ani

## IRRITATION

A persistent itchiness around the anus may complicate a recognisable lesion such as an anal fistula or third degree haemorrhoid but in many cases no associated lesion can be found and the cause is often never ascertained (Fig 29) The symptom may appear after some bowel upset or may be precipitated by antibiotic therapy Persistence of the symptom worries the patient and leads him to believe that cancer has developed or is about to do so Whatever the cause the itchiness is often worse at night and keeps the patient awake although when the symptom is the patient's chief worry it often proves to be idiopathic in origin

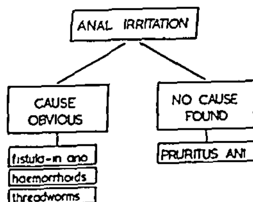



FIG 29
Common causes of anal irritation

## ALTERATION OF BOWEL HABIT

A regular daily bowel habit is acquired by most individuals Once and sometimes twice each day a sensation of fullness is felt in the rectum and this tends to persist until the bowels have been evacuated Irregularities developing in the daily bowel rhythm direct attention to the bowel especially if accompanied by bleeding pain or the presence of a

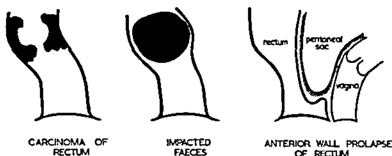



FIG 30
Common causes of unsatisfied defaecation

lump Constipation may be caused by an obstructing tumour but it is most often due to some dietetic fault or domestic difficulties Constipation alternating with diarrhoea is more suggestive of neoplasm particularly when some blood has been observed Diarrhoea with the frequent passage of blood stained liquid stools may be associated with a carcinoma or with some inflammatory lesion of the rectum and colon

Alteration of bowel habit assumes a special significance to the proctologist when associated with a feeling of *unsatisfied defaecation* (Fig 30) If the sensation of rectal fullness persists after defaecation the patient may regard himself as suffering from constipation Alternatively he may make frequent attempts to gain relief from the sensation and claim that he has diarrhoea Unsatisfied defaecation usually has a cause that can be discovered by physical examination of the rectum because the sensation arises from within the anus It is to be distinguished from the *unsatisfactory defaecation* associated with a condition such as rectocele

*Chapter Three*

# THE INVESTIGATION OF ANO RECTAL DISEASE

THE cause of the patient s symptoms is often apparent from the history after an ano rectal examination an accurate diagnosis can nearly always be made

A general physical examination is not omitted it includes the respiratory and cardiovascular systems and especially the abdomen The findings may not influence the diagnosis but may considerably modify the course of



FIG 31
Examining room (used by author)

action to be adopted to obtain a cure It is a matter of convenience and individual routine whether this general physical examination be conducted before or after the ano rectal examination

## REQUIREMENTS FOR ROUTINE ANO RECTAL EXAMINATION

It is not fair to embark upon an ano-rectal examination without a powerful light capable of easy adjustment (Fig 31) An anglepoise' type of light mounted on a stand and placed at the end of the examination couch is admirable for this purpose No special couch is required but it is useful to have a sliding ledge on the side of the ordinary couch so that the patient s buttocks can be brought beyond the edge of the couch (Fig 32) this allows the surgeon to move his head forward without difficulty as he follows the sigmoidoscope through the upper part of the rectum into the sigmoid colon

A glove or finger-cot protects the finger it should fit closely and without folds which might interfere with the smooth passage of the finger into the anal canal and rectum Petroleum jelly is not a satisfactory lubricant it is too viscous in cold weather it adheres to and mats together the hair of the anus and is difficult to remove Proctoscopes and sigmoidoscopes are difficult to clean after the use of petroleum jelly On the other hand paraffin and olive oil are too liquid by the time the finger has reached the anus most of the lubricant has dripped away The best lubricant is a mucilage which is water soluble It can be wiped off the anus after examination and

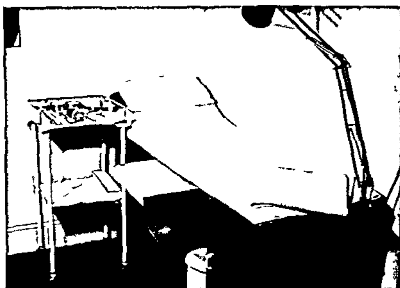


Fig 32
Note sliding ledge incorporated in examining couch It is useful for resting buttocks in sigmoidoscopic examinations

provides excellent lubrication for the sigmoidoscope from which it is easily washed The mucilage is prepared in bulk one ounce of tragacanth powder and nine ounces of glycerine are rubbed together and hot water quickly added (or a hot solution of mercuric perchloride strength 1 1 000) to make forty ounces

A proctoscope and sigmoidoscope ready for use are kept on a tray best placed by the head of the couch (Figs 31 32 33) Three sizes of cotton wool swabs should be on a tray the largest are used to wipe the anus after the examination is completed the medium swabs are used for cleaning the rectum through the proctoscope and the smallest are used in association with the sigmoidoscope Long alligator forceps are available for using the small swabs whilst a pair of long plain dissecting forceps is most suitable for the proctoscope swabs

A set of probes of varying sizes is kept in a dish on the tray Talc powder in a container with a perforated lid is available to sprinkle over the perineum after the examination in order to lessen the discomfort The surgeon should be so equipped as to be able to proceed to injection of haemorrhoids or other minor procedure without delay

## Position of the Patient for Ano Rectal Examination

The patient must be postured correctly for a satisfactory ano-rectal examination he rarely adopts the proper position without advice Thorough ano-rectal examination is made very difficult if the surgeon accepts the haphazard posture assumed by the patient

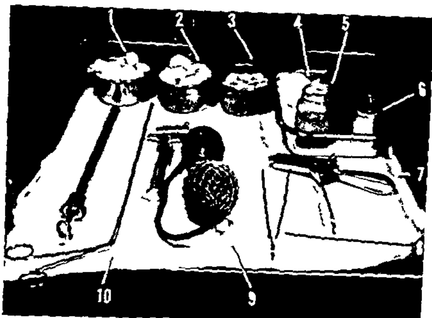



FIG 33

Routine ano rectal examination tray
1 Small cotton wool swabs for sigmoidoscope 2 Large cotton wool swabs for proctoscope 3 Finger cots 4 Wool to dry anus after examination 5 Lubricant 6 Talc powder for anus after drying 7 Proctoscope 8 Dissecting forceps for proctoscope 9 Sigmoidoscope eyepiece 10 Forceps for sigmoidoscope

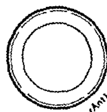
The left lateral position a modification of that introduced by Marion Sims in 1845 is adopted as a routine The patient lies on the left side with both legs flexed at the hips the upper right leg more than the lower left The buttocks should overlap the edge of the table so facilitating subsequent sigmoidoscopy The shoulders are rotated to bring the left arm out behind the patient This position gives maximum exposure of the perineum with relative comfort to the patient and allows the viscera to fall away from the pelvis The patient remains in the same position for each phase of the ano-rectal examination

# Ano-Rectal and Colonic Examination

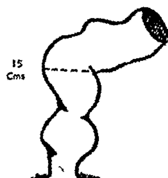
Inspection

Palpation

Proctoscopy




Sigmoidoscopy




Barium Clysma

Fig 34
Ano rectal and colonic examination sheet used by author

This position is far more preferable to the patient than the awkward and undignified 'knee-chest position This latter position is unsuited to the female patient and in the male patient is not often used because examination is just as easily performed in a left lateral position The knee-chest position is useful when the colonic contents are fluid as in ulcerative colitis because on proctoscopy air enters and fills the rectum and the fluid runs back into the sigmoid colon with subsequent sigmoidoscopy the wall of the bowel



FIG 35
Rectal examination of female patient
(Theod[illegible]c Library Un[illegible]ty (Clyde [illegible])

is more readily seen As a routine however the increased gravity is a disadvantage because a tumour may fall away from the sigmoidoscope If the knee-chest position is to be employed care should be taken when adjusting the patient to have the legs apart and the chest in contact with the couch and not the elbows or forearms

**Inspection**

*The surgeon places a warning* hand on the patient s uppermost hip and after reassuring the patient proceeds gently but firmly to separate the

buttocks Some lesions are seen at once The fingers are gradually moved nearer the anal orifice and by gently applying traction it is possible to expose the anal verge sufficiently to see an anal fissure The diagnosis of an anal fissure at this stage is important If a fissure is overlooked digital palpation of the anal canal and rectum causes severe and often agonising pain and the patient s confidence is lost and often never regained An anterior or posterior skin tag may be suggestive but they are not invariably present *A fissure can always be demonstrated by gentle traction on the anus It should be sought and diagnosed before the surgeon passes from inspection to palpation*

**Palpation**

The clinician should palpate both outside and inside the anal canal Palpation of the perianal tissues discloses invisible induration most fistulous tracks are low or high anal in situation and are surrounded by sufficient fibrosis to permit palpation Furthermore perianal palpation serves to warn the patient of the pending rectal examination

The finger can be introduced into the anal canal almost imperceptibly by flexing the terminal phalanx of the index finger as it lies over the anal orifice (Fig 36) As the finger is passed up the anal canal the patient is reassured that no embarrassing accident can occur Certain landmarks are at once sought so that the orientation of the hidden finger is made clear

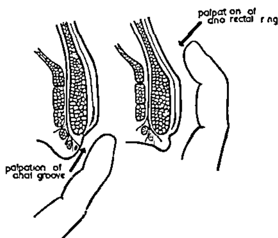



FIG 36
Palpation of anal groove and ano rectal ring

1 ANAL GROOVE —This groove is situated just inside the anal verge It corresponds with the visible groove which separates the internal and external haemorrhoidal zones and is situated at the lower border of the internal sphincter On palpation the lower border of the internal sphincter muscle is felt against the supporting external sphincter muscle (Fig 36)

2 ANO-RECTAL RING —Situated at the junction of the anal canal and rectum it is a composite fibro muscular band composed of the upper part of the internal sphincter muscle the longitudinal muscle the pubo rectalis muscle and the deep part of the external sphincter muscle (Fig 4) The posterior and lateral portions of the ring are easily palpable because of the sling like arrangement of the fibres of the pubo rectalis muscle Anteriorly where there is little or no pubo rectalis muscle the ring is formed by the deep external sphincter muscle and is not so easily defined The palpating finger has no difficulty recognising the important ano rectal ring the finger tip is level with it when the proximal interphalangeal joint is at the anal verge therefore

when the finger is inserted a little further the distal interphalangeal joint can be flexed over the upper surface of the muscular ring (Fig 36)

3 Lower Valve of Houston—Above the ano-rectal ring the finger enters the roomy lower rectum and frequently the finger can identify the lowest rectal valve of Houston and in some cases the middle valve can also be recognised as such It is important to appreciate that tumours on the upper surface of these valves seem to be outside the lumen of the rectum until the finger is passed around the free edge

On insertion of the index finger these landmarks can be recognised in most instances The average finger is about seven centimetres long by pushing on the perineum an extra two or three centimetres can be reached Therefore lesions within ten centimetres of the anus can be palpated with the finger (Fig 37) After reaching the upper palpable limit the finger is withdrawn slowly feeling the whole circumference of the walls of the rectum and anal canal Finally the digit seeks any pathological conditions outside the anal canal and rectum and is gradually reinserted feeling anteriorly posteriorly and on either side

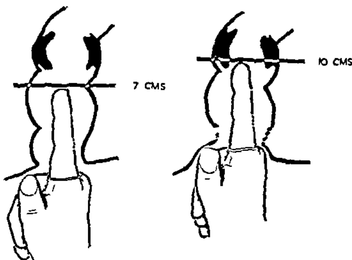


Fig 37
By pushing on perineum when palpating rectum it is possible to feel tumours as high as ten centimetres from anus if clinician does not do this his finger will reach only seven centimetres from anus and will miss tumours situated just above this level

In the male patient it is difficult to define anatomical structures above the base of the prostate In the female patient the cervix of the uterus should not be mistaken for a mobile tumour a mistake made the more likely when the cervix is irregular

Therefore digital palpation is carried out firstly around the anal verge secondly within the anal canal and rectum and thirdly outside the anal canal and rectum Landmarks should be recognised and the relationship of lesions within and without the lumen of the bowel noted with reference to these landmarks

## Proctoscopy

The proctoscope permits visualisation of the lower third of the rectum and the anal canal this region is difficult to see through the long sigmoidoscope

The main tubular part of the proctoscope in most common use is about two and a half inches (a little more than seven centimetres) long it is carried on a handle set at an angle to the tubular portion A proctoscope widely used

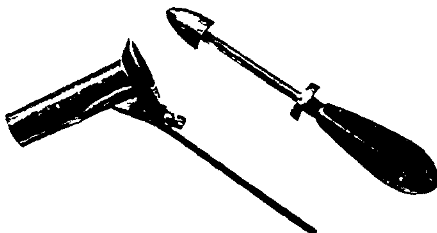


FIG 38
Milligan Morgan proctoscope
(Scale half size)

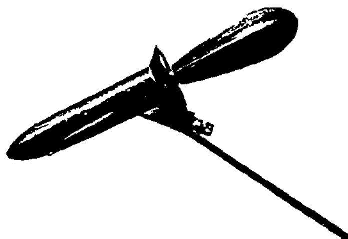


FIG 39
Milligan Morgan proctoscope The lamp socket *need not* be used because excellent illumination can be obtained from an angle poise light (Scale half size)

is that designed by Milligan and Morgan it has a special socket for a light but with a readily adaptable and strong light mounted on a stand at the end of the couch this light is rarely needed (Figs 38 39)

The proctoscope is passed blindly The instrument is held in the right hand and after lubrication is gently pushed into the anus Owing to the bend of the anal canal and rectum at the ano rectal ring the passage of the instrument is carried out in the following way The instrument is pushed in the direction of the umbilicus until the point enters the lower third of the rectum this is conveyed to the hand as a gentle give in the resistance offered in the initial passage The handle of the instrument is then moved forwards so that the point of the instrument is directed towards the hollow of the sacrum at right angles to the initial direction the instrument is then pushed further into the lower third of the rectum The proctoscope is steadied and the obturator removed

On removal of the obturator air usually fills the lower rectum and it is possible in many cases to visualise not only the lower third of the rectum but also the middle third in part As the proctoscope is slowly withdrawn the mucosa of the bowel suddenly falls into the open end to reduce the lumen in the same way that a camera aperture is narrowed (Fig 135) This point represents the ano rectal ring it is the strong anal musculature which pushes the mucosa into the proctoscope On further withdrawal of the proctoscope the walls of the anal canal beyond the mouth of the proctoscope are seen to come together completely As the instrument is withdrawn beyond the anal orifice it is not uncommon to see a ring of anal canal mucous membrane brought momentarily beyond the anal verge

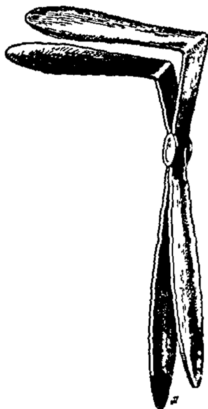


FIG 40
Anal speculum found in ruins of Pompeii

It is necessary to pass and re pass the proctoscope several times before the surgeon is satisfied that he has seen all that there is to see The degree of enlargement of the haemorrhoidal plexus can usually be determined only by proctoscopy Tumours in the lower third of the rectum are best visualised through the proctoscope Faecal material is easier to remove through the wide and short proctoscope than through the sigmoidoscope Therefore faeces likely to obstruct the passage of the sigmoidoscope can be removed at this stage

## Sigmoidoscopy

*Sigmoidoscopic examination is an essential part of the routine investigation* of diseases of the anal canal and rectum The sigmoidoscope was first developed by Kelly of Baltimore (Norbury 1923) his instrument was a straight tube thirty five centimetres long which was passed blindly by feel Although this was dangerous it was less likely to cause serious complications than passing a hand and forearm into the rectum as sometimes done by Allingham (1881) Kelly s instrument illumination was obtained by reflected light from a mirror on the forehead This has been replaced by electric light with the source of the light proximally situated and incorporated in the eye piece or distally at the end of the instrument

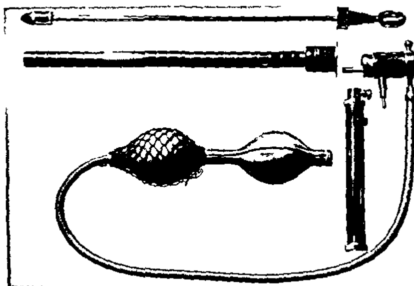


Fig 41
Lloyd Davies sigmoidoscope with author s battery handle This medium sized instrument is interchangeable with larger sigmoidoscope (*see* Fig 12)

All sigmoidoscopes possess a tubular portion usually twenty five to thirty centimetres in length an eye piece with or without a telescopic attachment bellows and a lighting system A suitable sigmoidoscope is the Lloyd Davies sigmoidoscope which has two tubular metal parts a narrow one which is one and a half centimetres in diameter and twenty five centimetres in length and a wider tube two centimetres in diameter (Figs 41 42) For routine examination the smaller tube is used The same eye piece is interchangeable for both tubes It carries the light globe which is situated proximally and has the beam directed distally down the tube by a metal cap The necessary voltage is provided by a lead from a separate battery or transformer An alternative source of voltage is from a battery within the handle fitting on the light plug (Hughes 1953)

*Although most of the modern sigmoidoscopes possess* proximal lighting some clinicians prefer the distal lighting supplied in such instruments as the

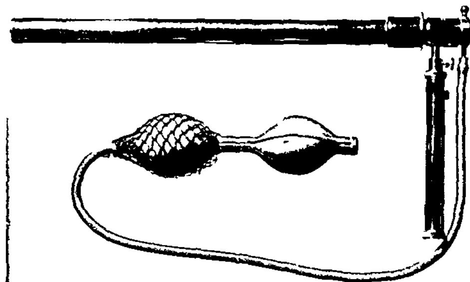


Fig 42
Lloyd Davies sigmoidoscope fitted with author s battery handle (Large sized sigmoidoscope )



Fig 43
Sigmoidoscopic examination Elbow of clinician rests on buttock so providing complete control over movements of patient *in relation* to sigmoidoscope

Strauss However distal lighting provides no better illumination than the proximal and has the major disadvantage of fading out as the globe is blurred with faeces mucus or blood

**Preparation for Sigmoidoscopy**

Preliminary enemata or bowel washouts are unnecessary except in occasional cases Bowel washouts are uncomfortable for the patient time consuming for the staff and may remove an important clue in the form of a tell tale scrap of bloody mucus

**Technique of Sigmoidoscopy**

The sigmoidoscope is smeared with lubricant and is inserted a distance of four or five centimetres along the anal canal into the lower third of the rectum The obturator is withdrawn and the eye piece with lighting apparatus and bellows inserted



Fig 44
Elbow does not touch buttock and sudden movement by patient may perforate rectum

The instrument is held in the left hand with the examiner s left elbow resting slightly on the patient s right hip This gives complete control over the movements of the instrument during its passage and is a safeguard against damage from an unexpected movement from an apprehensive patient (Figs 43 44)

The first landmark may be the lowest valve of Houston The instrument is passed over the edge of this valve and under that of the middle valve which is constantly seen and is approximately six to eight centimetres from the anal verge (Fig 45) It corresponds with the reflection of peritoneum from the middle third of the rectum Between four to seven centimetres higher the upper rectal valve is seen on the left side of the rectum During the passage of the instrument through the rectum it will be noticed that the direction changes In the lower third of the rectum the instrument points towards the

hollow of the sacrum but later the eye piece moves dorsally to allow the tip of the sigmoidoscope to follow the curve of the sacrum so that by the time it has reached the recto sigmoid junction it points towards the umbilicus (Fig 46) A little air needs to be pumped into the rectum but it is important for the patient s comfort that this is not done vigorously The instrument is passed with the tip barely touching the walls of the bowel (Figs 47 48)

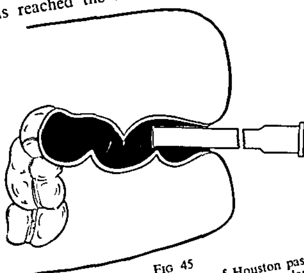


FIG 45
Sigmoidoscope negotiates valves of Houston passing over the two on left side and under the largest middle valve situated on right

The initial part of the procedure up to fifteen centimetres is quite simple The most difficult stage of the sigmoidoscopy is the manipulation of the instrument into the sigmoid colon No force may be used at any time and as is the case with most endoscopic examinations the sigmoidoscope may be advanced only when the lumen is seen With regard to this stage of the instrumentation certain observations are made (Fig 49)

In about twenty five per cent of cases the clinician has no difficulty at all The sigmoid lumen appears to lie in direct continuation with the rectum and the instrument slides to its full length straight into the sigmoid colon Just after passing into the colon pulsations transmitted from the left common iliac artery are visible Even when the limit of the instrument has been reached it is sometimes possible to see some distance beyond into the sigmoid colon

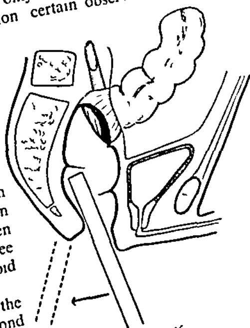


FIG 46
Sigmoidoscope rotates posteriorly as it is passed upwards.

In another twenty five per cent the passage of the sigmoidoscope beyond the recto-sigmoid region is impossible Occasionally alteration in the position of the patient or re-examination some days later will permit a complete sigmoidoscopy to be accomplished The opening into the sigmoid colon in these cases is in the anterior segment but is not found because the bowel is

so sharply kinked This may be of purely anatomical origin but it is not uncommon in diverticulitis and carcinoma of the lower sigmoid colon

In the remaining fifty per cent of examinations the clinician is able to negotiate *the recto sigmoid* junction but only after some difficulty In about half of these the opening appears to be on the left side and in about half on the right side The tip of the instrument is manipulated into the rectal cul de sac which lies above the upper valve of Houston the recto sigmoid junction is sought with patience and when found the tip is gently manoeuvred through and further passage for the full length of the sigmoidoscope becomes possible

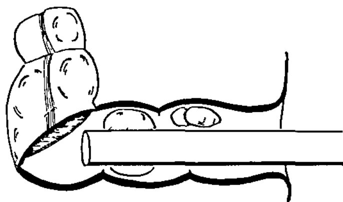


Fig 47
Sigmoidoscope can be passed alongside solid faecal material

It is important to record the distance from the anal verge that the instrument is passed the fact that the instrument reached only fifteen or eighteen centimetres that the recto sigmoid junction could not be negotiated is not an admission of lack of skill but a statement of fact which assists the radiologist who subsequently performs a barium clysma and which might lead the surgeon to advise laparotomy in a suspicious case (Fig 50)

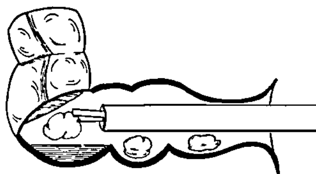


Fig 48
If liquid faecal material is present in lumen of rectum cotton wool swabs are introduced and left in bowel

**Complications of Sigmoidoscopy**

1 Pain —A certain amount of discomfort is inevitable in these investigations There are however two common causes of pain which may be avoided or minimised by careful technique

The first is over-distension of the bowel with air (Fig 51) in the rectum this produces an urgent desire to defaecate and in the sigmoid colon a griping abdominal pain which might be severe Excessive introduction of air is unnecessary

Secondly pain may arise from forcible stretching of the anus during the negotiation of the recto sigmoid junction This may be relieved by placing

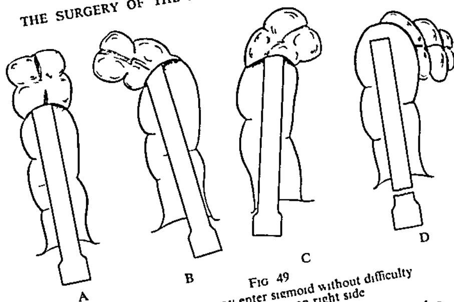



Fig 49

A—Sigmoidoscope may enter sigmoid without difficulty
B—Opening into sigmoid may be on right side
C—Opening may be on left side
D—Instrument cannot be negotiated into sigmoid colon this happens in twenty five per cent of cases

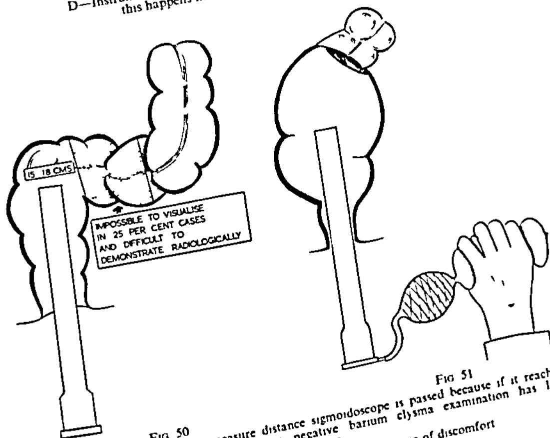



Fig 50

Fig 51

Fig 50 It is important to measure distance sigmoidoscope is passed because if it reaches only fifteen to eighteen centimetres a negative barium clysma examination has less significance

Fig 51 Over distension of rectum with air is a cause of discomfort

the fingers of the left hand on the instrument at the anal verge thereby trans ferring the fulcrum for the necessary leverage from the anus to the fingers (Fig 52)

2 PERFORATION OF THE BOWEL—Fortunately this is rare and usually occurs anteriorly above the peritoneal reflection A gentle technique and especial care in cases of ulcerative colitis should avoid the danger of this complication

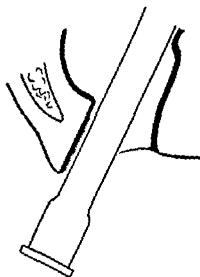


FIG 52
As sigmoidoscope rotates pressure on coccygeal region may cause discomfort

## SPECIAL INVESTIGATIONS

### Examination under Anaesthesia

In some patients a satisfactory ano rectal examination is not possible because of extreme apprehension on the part of the patient or because of intense discomfort In these circum stances the examination should be performed under general anaesthesia Examination under anaesthesia may also provide some additional information when the problem under investiga tion is obscure

### Radiological Examination

Radiological investigations are rarely necessary in ano rectal disease A plain film of the pelvis may reveal a suspected osteomyelitis or chondroma Films taken after the instillation of barium into the rectum or iodine solutions into sinus or fistulous tracks supply useful information only in exceptional cases

### Biopsy

In the diagnosis of some lesions a biopsy is useful but rarely is it of more than confirmatory value In the biopsy of lesions below the anal valves a local anaesthetic is necessary

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*Chapter Four*

# SURGICAL WOUNDS OF THE ANAL REGION

IT does not matter in which region or on what system the surgeon may operate he is vitally concerned with wound healing  Some wounds demand special technical considerations because of their situation but the principles which govern repair are the same

The surgeon s first objective is a covering of epithelium but in achieving this he will wish to avoid wound infection which leads to tissue destruction and which may be disastrous to the result of the operation

Wounds in the region of the anal canal and rectum have been given an almost notorious significance but their special features are related to their position and not to any different principles of wound healing

## SPECIAL FEATURES OF ANO RECTAL SURGICAL WOUNDS

### Contamination

All wounds are contaminated but because of their situation ano-rectal wounds are likely to be more so than most But contamination does not necessarily result in infection Only when conditions are suitable does a contaminating organism become infective and destructive and responsible for an inflammatory reaction Haematoma formation dead and devitalised tissue and foreign bodies all favour wound infection Ano-rectal wounds are vascular in their superficial part and many ligatures are needed but the deeper fat locules are relatively avascular and easily devitalised With the possibility of heavy contamination these wounds appear to be singularly unsuited for first intention healing

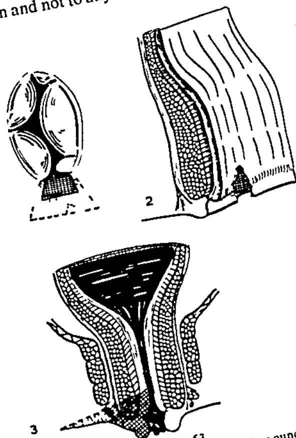



FIG 53

1 Inaccessibility of anal portion of wound (dark shading) improved by enlarging wound outwards (stippled area)

2 Inaccessible anal portion of wound from anal canal aspect

3 Inaccessibility of anal portion of wound (dark shading) improved by enlarging wound outwards (stippled area)

**Inaccessibility**

Ano rectal wounds situated as they are in the loose skin of the anus partly within and partly without the anal canal are relatively inaccessible and this is especially so when the anus is situated more deeply than usual between the ischial tuberosities The most inaccessible part of the wound is the anal extension because not only does it open into the anal canal but it is further concealed by contraction of the anal sphincters The only way to visualise this zone satisfactorily and to keep it under direct vision is to extend the wound into the perianal region (Fig 53) This presents no difficulties when treating an anal fistula because the wound nearly always has to have such an extension to include the whole length of the fistulous track When excising a fissure on the other hand a deliberate back-cut is neces sary to make the anal end of the wound more accessible

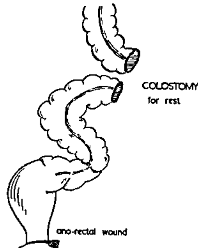



FIG 54
To immobilise an ano rectal wound for longer than a week a colostomy is necessary

**Lack of Immobilisation**

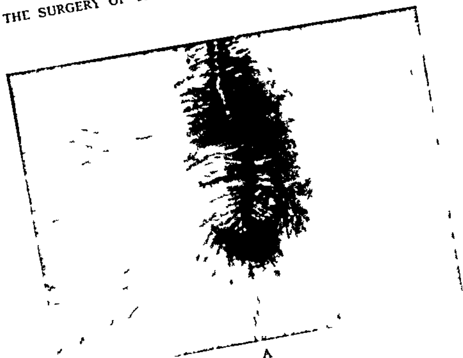
Immobilisation is a valuable aid to wound healing but this cannot be achieved in ano rectal wounds for longer than about a week unless a preliminary colostomy has been per formed (Fig 54) Such a step would not be welcomed by the patient if there were other alternatives Little difficulty is experienced in keeping the bowels inactive for as long as a week but to ask for longer than this is unfair

**Deceptive Size**

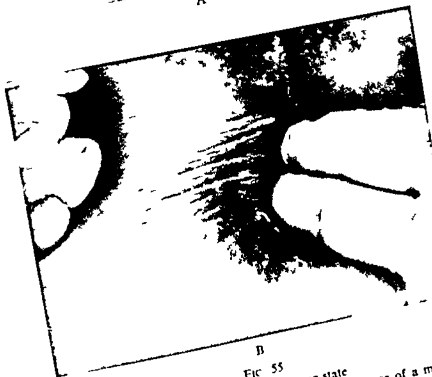
The anus is normally closed and remains so even when the patient is anaesthetised Fine folds of skin radiate outwards from the closed anus On defaecation the anal orifice proves itself capable of considerable stretching with obliteration of the folds of the skin but at the completion of the act the anus immediately closes with the reformation of the skin folds (Fig 55 A B) A wound made in the margin of the resting anus may seem small enough until the anus is stretched when the wound will appear of much greater size than was thought

**Formation of Anal Fistula**

An infected wound usually proceeds to abscess formation and once this has discharged healing takes place by second intention However if an abscess develops in an ano rectal wound it may be followed by the formation of a fistula This is of no particular consequence with superficial wounds such as haemorrhoidal wounds because a fistula although annoying can be treated



A



B

FIG 55

A—Anal orifice Resting state

B Anal orifice showing distensibility to permit passage of a motion and elasticity to enable it to resume normal resting state

with minimal inconvenience to the patient But for the deeper wounds a fistula is a most unfortunate complication

## TREATMENT OF ANO RECTAL SURGICAL WOUNDS

Following excision of the lesion whether it be a fistula fissure haemorrhoid or skin tag the surgeon directs all his attention to securing an epithelial covering in the shortest space of time but without wound infection

### Second Intention Healing

The oldest method advocated by most proctologists past and present and one certainly practised by the majority of surgeons aims at second intention healing (Fig 56) The epithelium advances from the edges of the wound which is soon covered by granulation tissue which contracts as it matures so reducing the size of the wound Initially the wound is made as smooth as possible and subsequently is carefully watched to ensure that it remains flat and does not form pockets Although heavily contaminated an open ano rectal wound rarely shows any significant evidence of clinical infection

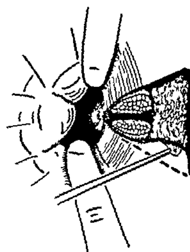


Fig 56
Wound trimmed for healing by second intention

Second intention healing is sure but it is slow Furthermore if any part of a fistulous tract has been left behind it is often not apparent that something is amiss until the wound has almost healed and a persistent sinus remains in the wound Subsequent exploration shows the fistula to be still present The operation takes but a few minutes but the efficient management in the post-operative period requires patience as well as highly skilled nursing The period in hospital may extend for some weeks Attempts have been made to hurry on the healing of these wounds by the application of free skin grafts to the granulation tissue But such modifications come at a time when the patient wants to be on his way and not committed to a further period in bed Various lotions have been suggested to stimulate the growth of epithelium but none have yet been shown to be effective in this regard

Perhaps second intention healing is the method for the occasional surgeon to follow but all the same it is a procedure which demands constant supervision and revision in the post-operative period It must be a bitter experience for a patient to undergo an operation which is followed by weeks in hospital with daily painful dressings only to find that at the end of it the operation was a failure

The plastic surgeon with his knowledge of wound healing and appreciation of the importance of early skin covering cannot be expected to remain passive in this field if other surgeons persist with second intention healing It is important to remember that with this method the operation is not completed when the patient leaves the theatre but when the wound is healed If the time occupied doing the dressings is taken into account the whole procedure will be found to have taken a surprisingly long time

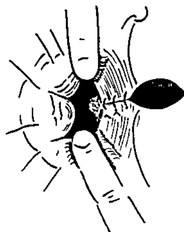


Fig 57
Sutures inserted for healing by first intention

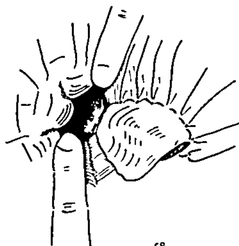


Fig 58
Primary free skin graft

**First Intention Healing by Suture**

These wounds have been treated by primary suture for many years After the lesion has been dealt with the wound is sutured with care to ensure accurate apposition of the skin edges (Fig 57) There must be no haematoma formation and no potential space in which one can form Dead tissue must be minimal and contamination reduced as much as possible Sutures should be placed carefully and not tied tightly The successful case is quite dramatic the patient leaves hospital in about a week or ten days with the wound healed

First intention healing by primary suture is well suited for small superficial wounds such as the skin wounds of the haemorrhoidal operation and after excision of skin tags in pruritus ani But for deeper wounds and wider superficial wounds such a technique is inadvisable It seems strange for a surgeon to dissect out a fistulous track a tedious operation in some cases and then close the wound by primary suture To rely on antibiotics to sterilise the track is dangerous It is well known that a fistula may remain dormant for years only to recur in the same way that osteomyelitis might become reactivated after a long latent period Furthermore a most serious disadvantage of primary suture is the possibility of burying a track which has been incompletely excised It is easy to find a fistulous track in most of its length but it is not at all uncommon for the surgeon to miss the internal opening



A



B

FIG 59

A—Fresh wound right posterior quadrant of anus Too extensive for primary suture can be left to heal by granulation tissue but process takes a long time to complete

B—Application of primary free skin graft most satisfactory treatment In case illustrated there was complete take and patient left hospital on seventh post-operative day with wound healed

Although this may mean that a short length only of the fistulous track remains it is a possible cause of recurrence of the fistula as a whole For these reasons primary suture of surgical wounds in this region has and will never become standard practice

**First Intention Healing by Primary Free Skin Grafting**

The most satisfactory procedure is to apply a free skin graft to the wound as a primary procedure (Figs 58 59 60) The lesion is excised in the same way as is done prior to second intention healing and after haemostasis has been secured a sheet of thin skin cut from the thigh is applied to the surface This is sutured into place and given further protection by carefully applied dressings The wounds are not dressed until the fourth fifth or sixth day depending upon the comfort of the patient After the dressings have been removed and the wound inspected it is re-dressed with a piece of cotton wool The bowels are allowed to act and the patient may be discharged from hospital The wound is checked once again a week later and the rectum palpated for impacted faeces

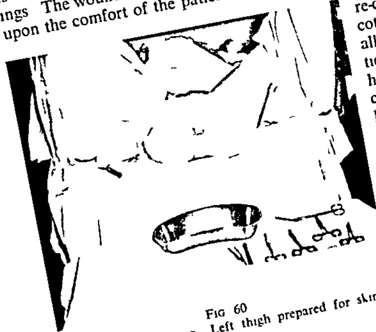


Fig 60
Ano rectal operation Left thigh prepared for skin grafting

Technically the procedure is difficult and the covering of large irregular wounds with skin may prove very tedious But the reward far outweighs the inconvenience caused to the surgeon To have a wound healed and the patient on his way home a week after admission is more than satisfactory Yet it is the rule with the primary skin graft Contamination technique A fresh wound is an ideal one for a split skin graft but this is not the case with only results in infection if the medium is suitable but this is not the case with flat wounds Inaccessibility of the wound is overcome by the excellent exposure provided by the use of relaxants in anaesthesia combined with as much radical lateral extension of the wound as is required No restriction need be imposed on the amount of skin excised because the skin graft will take with a degree of certainty Lack of immobilisation does not concern wound healing in these cases because the first dressing is done on the fourth fifth or sixth day after which the bowels will act If the track has been excised incompletely at its terminal portion recurrence might develop but the track in such circumstances is as short as it was at the completion of the initial operation and the

overlying tissue but a millimetre or two in thickness such a recurrence could be treated under local anaesthesia without the need for readmission to hospital

Sometimes bleeding from the wound is so steady that it is not possible to place the graft over the wound with safety In these circumstances the wound should be covered with dry gauze which is left undisturbed for two days at the end of which time the patient is returned to the theatre the dressing removed the wound irrigated clear of adherent clots and the graft applied The wound is still fresh in appearance and free from granulation tissue This modified method is referred to as *delayed primary skin grafting*

In some cases part or whole of the graft fails to take and when the dressings are removed the skin comes away to leave a raw wound This is allowed to heal by second intention Primary skin grafting has proved so successful in the treatment of fistulae fissures pruritus ani and other lesions of the anus and anal canal that as far as the author is concerned it has almost completely supplanted the other two methods of obtaining wound healing If the wounds are small and superficial a skin graft may not be considered necessary The operation may be inadvisable for certain elderly male patients who should be out of bed as soon after the operation as possible if urinary retention is to be avoided

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*Chapter Five*

# ANAESTHESIA FOR ANO RECTAL SURGERY

by

G HOUSEMAN M R C S L R C P F F A R C S, F F A R A C S D A

FROM the anaesthetist s point of view the types of operation performed on the anal canal and rectum may be divided into three main groups

1 *Short non traumatic operations e g* haemorrhoidectomy, excision of anal fissure and perianal fistula

2 *Long non traumatic operations e g* excision and skin graft of ischio-rectal anal fistula

3 *Radical traumatic operations requiring blood replacement e g* exci sion of the rectum

Nearly all operations on the anal canal and rectum are performed with the patient in a lithotomy position although the pilonidal sinus is excised with the patient lying almost vertically on his left side

## SHORT NON TRAUMATIC OPERATIONS

Anaesthesia of short duration and producing moderate relaxation of the anal sphincter is required for short non traumatic operations

General anaesthesia has almost completely replaced spinal analgesia which was once considered the anaesthetic of choice by many anaesthetists and surgeons As a rule patients prefer to be asleep during their operations Further the risk of post spinal sequelae does not justify the use of this method for minor surgical procedures

### Technique of Anaesthesia for Short Non Traumatic Operations

Edentulous patients should retain their dentures so that the cheeks do not fall in and prevent the anaesthetic face piece from making a gas-tight seal with the cheeks (Fig 61)

Intravenous sodium thiopentone (0 25 to 0 75 g) and a moderate dose of a muscle relaxant such as 40 to 100 milligrams of Gallamine Triethiodide (Flaxedil May & Baker) which is freely mixable in all proportions with thio-pentone are administered and as soon as the patient is asleep an oropharyngeal airway is inserted Anaesthesia is maintained with an inhalation anaesthetic using carbon dioxide absorption Nitrous oxide supplemented if necessary by cyclopropane is preferred because it disturbs the patient least post operatively Respirations should be assisted as long as is necessary from the commencement of anaesthesia

## LONG NON TRAUMATIC OPERATIONS

These operations are performed in the lithotomy position Anaesthesia producing moderate muscle relaxation may be required for several hours Blood loss is usually small in amount but it is wise for the anaesthetist to watch this as the surgeon in his concentration may overlook even a considerable haemorrhage




FIG 61

A gas tight fitting facepiece is essential for good anaesthesia
A—Patient with dentures
B—Same patient without dentures note the cheeks have fallen in
C—Facepiece fits closely when patient wears dentures
D—Removal of dentures allows cheeks to fall in Facepiece fits badly

### Technique of Anaesthesia for Long Non Traumatic Operations

General anaesthesia as already described for the shorter procedures may be sufficient but the insertion of an endotracheal tube may be considered necessary to ensure a perfect airway throughout what may prove to be a lengthy anaesthetic (Fig 62) The surgeon may from time to time during the operation request contraction of the anal sphincter and this can be effected by an intravenous injection of two to three milligrams of nikethamide (Anacardone Coramine) or if an endotracheal anaesthetic is being administered

the tube may be pushed down to the carina to produce coughing and contracture of the anal sphincter

## RADICAL TRAUMATIC OPERATIONS REQUIRING BLOOD REPLACEMENT

Extreme relaxation of about one hour s duration is required for an abdomino perineal excision of the rectum Blood replacement therapy during the course of the operation is essential and for this purpose an intravenous infusion is placed in the right arm

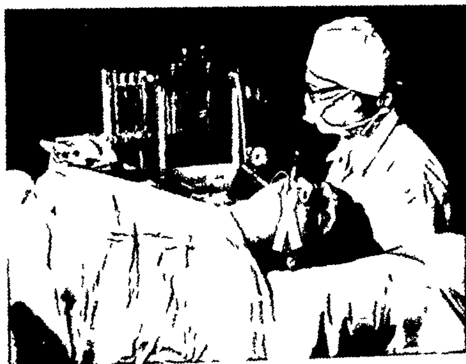


FIG 62
Endotracheal anaesthesia in progress for excision and skin graft of ischio rectal anal fistula

Mid spinal analgesia with light general anaesthesia is still popular in some centres The advantage claimed for this technique is the reduction in blood loss as a result of the hypotension produced by the spinal anaesthetic so eliminating haemogenic shock However the end results of cases anaesthetised by the thiopentone/tubarine/endotracheal nitrous oxide and oxygen sequence are just as good as those following the more complicated combined technique Further there is no risk of post spinal sequelae with the pure inhalation technique

### Technique of Anaesthesia for Radical Traumatic Operations

General anaesthesia combined with a muscle relaxant is the most satisfactory After induction with intravenous thiopentone an endotracheal tube

is passed with the aid of a muscle relaxant Intubation is essential to avoid inflation of the stomach with gas from positive pressure D tubocurarine chloride is the most suitable relaxant as unlike Gallamine Triethiodide it does not influence the pulse rate so that this can be used as a guide to the patient s condition during operation Anaesthesia is maintained with endotracheal nitrous oxide and oxygen If diathermy is to be used an explosive anaesthetic agent is of course excluded from use

When settled under the anaesthetic the patient is lifted from the trolley and placed on the operating table with the legs supported in an abducted and slightly flexed position by means of the Lloyd Davies leg pieces During the

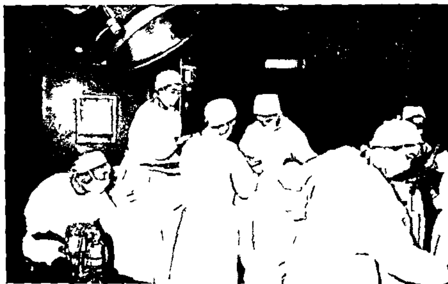


FIG 63
Combined excision of rectum in progress Anaesthetist seated at one side of table has access to patient under instrument tray

transfer of the patient from the trolley to the table the anaesthetist should disconnect the endotracheal tube from the anaesthetic machine to avoid accidental extubation

When in position on the operating table padded shoulder rests are placed in position in such a way as to take the weight of the patient on the acromio clavicular joints The arms are kept to the sides by boards fitted to the table Posturing of the patient is carefully supervised to prevent nerve lesions caused by stretching of or direct pressure on the brachial plexus Flexed elbows overhanging the edge of the operating table may result in an ulnar nerve injury especially if the surgeon should lean inadvertently against the arm Side boards on the table prevent this and also protect the intravenous tubing from becoming occluded

The anaesthetist takes up a position to the right of the patient s head leaving the head of the table for the instrument sister (Fig 63) She has

then a clear view of the operation field and can anticipate the surgeon s requirements

During the operation the anaesthetist records blood pressure readings at regular intervals These readings should be constant throughout provided adequate blood replacement and pulmonary ventilation have been maintained Blood transfusion is started if the surgeon decides to remove the rectum Inadequate blood transfusion anoxia or carbon dioxide retention are the greatest dangers to the patient from the anaesthetist s point of view It is most important with surgery of this nature that the anaesthetist keeps a close watch for early signs of these developing so that appropriate measures can be taken immediately

At the end of the operation the table should be brought back to the horizontal position slowly so that the alteration in posture will not affect the patient s condition this also applies to the lowering of the patient s legs It is a wise plan to have the patient s bed brought to the theatre so that he can be transferred directly from the operating table to the bed so avoiding the extra movement necessary with a trolley

abscess and the track is confined to the submucosa The track runs up and down the length of the anal canal with the higher opening in the region of the ano-rectal ring or above and the lower at the anal groove

**2 Secondary Submucous Anal Fistula**

There is a submucous fistulous track but in addition there is a perianal or ischio-rectal anal fistula Such a fistula is secondary to a collar stud abscess one locule of which was in the submucosa and the other in the peri anal space It is important to recognise this secondary variety because one component might escape attention

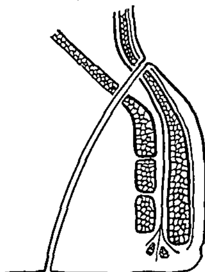


Fig 92
Rectal fistula

RECTAL FISTULA

Rarely a fistulous track passes from an external opening to the rectum above the ano rectal ring This fistula does not pursue an intramuscular course at any time The track has no characteristic situation and unlike the ischio rectal fistula its internal opening is not necessarily in the midline posteriorly (Fig 92)



Fig 93
Recurrent perianal abscess (left pos terior) with anal fistula formation

## COMPLICATIONS OF AN ANAL FISTULA

**1 Recurrent Abscess**

From time to time the fistulous track tends to close Cessation of free drainage favours the formation of an abscess which may discharge spontaneously but some times requires incision (Fig 93)

**2 Carcinoma**

The occasional association of carcino ma of the rectum or anal canal with an anal fistula is recognised The carcinoma may have been present initially and the fistula developed secondarily or it is suggested the fistula may predispose to malignant change Certainly the occasional fistulous track is patchily lined by epithelial tissue and it is possible that such tissue might become neoplastic (Fig 94)



FIG 94
Extensive perianal carcinoma associated with fistula formation

## CLINICAL FEATURES OF ANAL FISTULA

**1 Symptoms** (Tables I IV)

Discharge intermittent or persistent is the most common symptom The discharge is purulent or sero purulent and occasionally tinged with blood The moisture around the anus is responsible for anal irritation A painful lump due to abscess formation appears from time to time The bowel habit is normal

**2 Inspection**

Inspection of the anus usually reveals the external opening of the fistula although it might be concealed in the radiating folds of perianal skin (Figs 97 99 103 104) The orifice is small and is filled with granulation tissue which projects slightly above the surrounding skin Epithelium may grow over the granulation tissue and if the fistula should remain closed in this way for some weeks the site of the external opening becomes hard to see With the perianal fistula the external opening is often within three to five centimetres of the anus with ischio rectal anal fistulae the opening is typically more than five centimetres outside the anal margin The surrounding skin may show evidence of persistent chafing or scratching

**3 Palpation**

After careful palpation of the perianal tissues diagnosis in mos can be made Leading from the external opening is th c by granulation tissue and surrounded by fibrous tissue

easily palpable if it does not dip away too deeply from the perianal skin In the perianal fistula the fibrous track can be palpated from the external opening to the anal canal It usually passes directly towards the anus The tracks of

TABLE I
ANAL FISTULA

| | *Male* | *Female* | *Total* |
|---|---|---|---|
| Perianal | 55 | 25 | 80 |
| Ischio rectal | 9 | 6 | 15 |
| Submucous | 1 | 1 | 2 |
| Rectal | 2 | 1 | 3 |
| | | Total | 100 |

TABLE II
PERIANAL FISTULA

| | |
|---|---|
| Anterior or Antero lateral | 31 |
| Posterior or Postero lateral | 42 |
| Lateral | 7 |
| Total | 80 |

TABLE III
ISCHIO RECTAL ANAL FISTULA

| | |
|---|---|
| Male | 9 |
| Female | 6 |
| Total | 15 |

Average age 46 years

TABLE IV
ISCHIO RECTAL ANAL FISTULA

| | | |
|---|---|---|
| *Bilateral* | | 9 |
| *Unilateral*— | | |
| Left side | 4 | |
| Right side | 2 | 6 |

most high perianal fistulae can also be palpated although less readily Ischio rectal anal fistulous tracks cannot be palpated under the skin because the track runs more or less vertically away from the skin

When the digital examination within the anal canal is combined with palpation outside nearly all the necessary information for diagnosis can be obtained The finger is inserted into the anal canal and the internal opening can often be felt as a dimple an irregularity or as a fibrous pin head projection Induration within the ischio-rectal fossa will usually be appreciated by palpation above the level of the ano rectal ring because the sloping levator ani muscle is responsible for that fossa extending *above* the level of the ano-

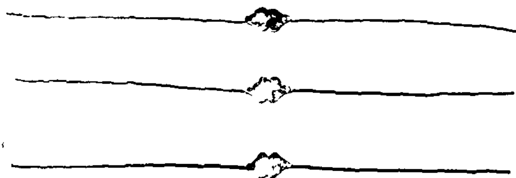


Fig 95
Set of lachrymal duct probes used by author for anal fistula

rectal ring Intra anal palpation will permit recognition of the longitudinal track of the submucous fistula which often extends well above the ano-rectal ring into the rectum care is taken to exclude a perianal fistula in association with the submucous fistulous track

**The Use and Abuse of the Probe**

*Many clinicians proceed to probe every anal fistula Probing is nearly always a painful procedure* It traumatises the track and may create a false passage into the anal canal Palpation permits the diagnosis of the type of anal fistula in about nine of every ten cases so that probing can usually be avoided

However probes of varying diameter *should always be available (Fig 95)* *The appropriate probe is selected and passed gently* along the track aided by one finger in the anal canal In perianal anal fistulae the probe passes very obliquely in the high perianal fistula the probe passes towards the anal canal at an angle of about forty five to sixty degrees In the ischio-rectal anal fistula the probe passes vertically upwards *at right angles to the perianal skin* and parallel to the *anal canal* a *finger* within the anal canal will identify *the tip of the probe* in the ischio rectal fossa above the level of the ano-rectal ring

## Perianal Fistula (Low and High Anal Fistulae)

This is the most common type of anal fistula and accounts for eighty per cent of cases (Figs 82 83) The track passes from the perianal skin to the anal canal which it enters about the level of the anal valves or approximately at the muco-cutaneous junction The track passes above the subcutaneous components of the external sphincter muscle but below the remainder of that muscle it passes through the lower fibres of the internal sphincter muscle A typical perianal fistula might be seen in any quadrant of the anus there is usually just one external opening from which the track runs radially to enter the anal canal Some perianal fistulae are *atypical*

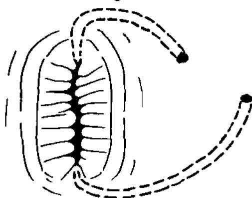


Fig 84
Perianal anal fistula Atypical course pursued by tracks

**1 Curved Perianal Fistula**

The track may not course radially towards the anal canal from an external opening the fistulous track curves towards the internal opening situated either in the midline anteriorly or posteriorly (Fig 84)

**2 Complicated Perianal Fistula**

Occasionally a perianal fistula has two separate openings closely related to one another sometimes there are two separate perianal fistulae tracks



Fig 85
Two separate perianal fistulae Both wounds were grafted and this view on seventh post operative day shows complete take in left anterior wound but a haematoma has lifted central part of graft in right posterior wound

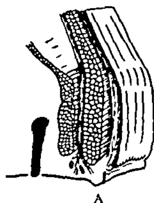
without any communication between them (Fig 85) A perianal fistula might be present as part of an ischio rectal anal fistula or in association with a submucous fistula

### 3 Blind Perianal Fistula

An external opening may be visible but no internal opening is to be found even at operation this type is known as the *blind external fistula* If there is an internal opening but none externally the sinus is referred to as a *blind internal fistula* (Fig 86) A blind internal fistula is not uncommonly associated with a chronic dorsal anal fissure

### 4 Subcutaneous Perianal Fistula

Sometimes the track of the perianal fistula is more superficial than usual and does not appear to traverse the lowermost fibres of the internal sphincter



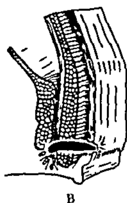




FIG 86
Atypical perianal fistula Blind external (A) and internal (B) varieties

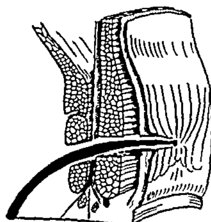


FIG 87
High perianal fistula

muscle at all The relation of this fistula to the subcutaneous external sphincter muscle is often uncertain and in any case of no importance Such an anal fistula is sometimes referred to as a subcutaneous anal fistula or fistulette (Esmarch 1887)

### 5 High Perianal Fistula

If the track penetrates more deeply it is known as a *high perianal fistula* The track passes through or deep to the superficial external sphincter muscle and through the internal sphincter muscle The mucosa of the anal canal is usually puckered around the internal orifice so obscuring its relationship to the anal valves but it is very close to that level (Fig 87) This deep form of low perianal fistula is entitled to special consideration because the cure of such a fistula requires division of a considerable part of the anal sphincter

muscle and the surgeon must determine very carefully whether or not sufficient sphincter muscle will remain for adequate function after the fistula has been laid open

### Ischio Rectal Anal Fistula (Ano-Rectal Fistula)

This term is given to the anal fistula which is the sequel of an ischio-rectal abscess The main track of the fistula lies in the ischio rectal fossa on one or both sides if bilateral a communicating track passes through the deep

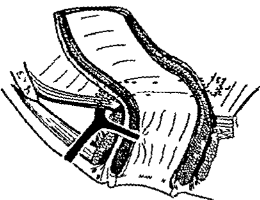


Fig 88
Ischio rectal (or ano rectal) anal fistula Internal opening is in midline posteriorly external opening may be at any situation Ischio rectal track lies in ischio rectal fossa above level of ano rectal ring

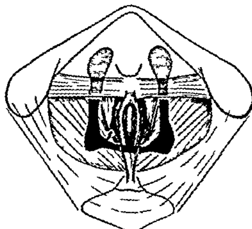


Fig 89
Ischio rectal (or ano rectal) anal fistula Bilateral type

post anal space From one or more external orifices a track leads almost vertically to the main fistulous track and meets it either in the ischio rectal portion or in the posterior communication There is an internal opening in the midline posteriorly and from this a short track joins with the posterior communicating track (Figs 88 89 100)

**1 External Orifice**

The external opening is usually placed about five centimetres or more from *the anal orifice It may be closer or alternatively more remotely situated* as in the thigh (Fig 90) The external orifice of the fistula may be single or multiple if the latter a separate opening on either side of the anus is characteristic but sometimes multiple openings puncture the perianal skin

**2 Internal Orifice**

The internal orifice is situated posteriorly either in the midline or just to one side immediately below the ano rectal ring The relation to the muco cutaneous junction is difficult to determine because the mucous membrane is puckered around the granulating orifice An opening above the ano rectal ring is very rare and is usually the result of some previous inexpert surgery

although sometimes a submucous track carries the internal opening above this level

3 **The Fistulous Track**

In most cases the track is horseshoe in shape The two limbs of the horseshoe extend into the ischio-rectal fossa and may reach almost to the

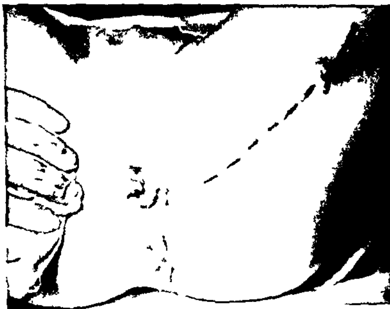


Fig 90
Ischio rectal anal fistula with external opening in left thigh
(Patient of Mr Graeme Gr e)

pubis anteriorly (Figs 89 100) The base of the horseshoe is situated posteriorly and lies in the deep post anal space If the track is unilateral it curves from the ischio-rectal fossa into the deep post anal space and thence into the internal orifice The fistula may be associated with a superficial track and be mistaken for a perianal fistula rarely there is an extension through the levator ani muscle

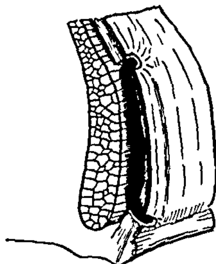


Fig 91
Submucous anal fistula

### Submucous Anal Fistula

The submucous anal fistula is uncommon The track lies in the submucosa of the anal canal but may continue in the submucosa beyond the ano-rectal ring into the rectum Two varieties of the submucous anal fistula are seen

1 **Primary Submucous Anal Fistula (Fig 91)**

The fistula is a sequel of a submucous

**The Importance of Proctoscopy and Sigmoidoscopy**

Proctoscopy and sigmoidoscopy must not be omitted Haemorrhoids may be found and these can be treated at the same time as the fistula or an anal polyp may be unexpectedly visualised The discovery of ulcerative colitis or a carcinoma of the rectum or lower colon will completely change the surgical approach to the problem

**The Place of Radiology in the Diagnosis of Anal Fistula**

As a general rule radiology has no place in the investigation of an anal fistula In the occasional atypical case it may prove invaluable osteomyelitis of the ischial tuberosity or of the inferior ischio pubic ramus may be responsible for a sinus in close relation to the anus and the pathological changes in the bone will be disclosed by a straight X ray of the pelvis

The track itself can be demonstrated after radio opaque material has been injected into it but the interpretation of the resulting films even with stereo scopic aid is not easy and in any case is of very limited value

An X ray of the chest should be done if the history and physical examina tion are suggestive of tuberculosis In this regard a fistula appearing painlessly should be regarded with suspicion

**The Significance of Goodsall s Rule**

Goodsall an honorary surgeon to St Mark s Hospital from 1871 to 1903 suggested that if a line be drawn transversely across the centre of the anus external openings anterior to this line will usually have tracks proceeding directly towards the anal canal whilst external openings behind this line often possess tracks which curve to enter the anal canal in the midline posteriorly The rule serves to direct attention to the different directions that may be followed by a fistulous track

## DIFFERENTIAL DIAGNOSIS OF ANAL FISTULAE FROM OTHER PERINEAL INFECTIONS

The diagnosis of an anal fistula usually presents no special difficulty The previous history of abscess followed by intermittent discharge and the presence of a small granulating area near the anus from which leads a fibrous track directed towards the anus are diagnostic features Occasionally difficulty may be encountered with suppurative hidradenitis perianal pilonidal sinus periurethral infection and osteomyelitis

***Suppurative Hidradenitis***

This condition is associated with infection of the perianal apocrine glands The inflammation arises in multiple glands covers a variable area of skin and extends into the subcutaneous tissue There are often numerous sinuses discharging a thin seropurulent material (Fig 114) Palpation discloses a certain nodularity of the surface of the indurated area which is caused by

many foci of infection There is no palpable extension into the anus The lesion may extend forwards between the scrotum and thigh into the groin There may be similar lesions in the axilla

**Perianal Pilonidal Sinus**

This condition is probably a sequel to a long standing anal fistula Hair enters the external orifice and the resulting foreign body reaction which it excites as it lies in the deep tracks is responsible for dense fibrosis of almost cartilaginous consistency The patient will state that the fistula has been present for years whilst palpation will disclose a well defined densely hard area alongside the anus one or more sinuses may be visible on the surface, but a probe cannot be made to enter any distance There is no involvement of the anus or anal canal (Fig 113)

**Urethral Fistula**

Infection in the posterior portion of the penile urethra may be responsible for abscess formation and subsequent appearances of discharging sinuses or a urethral fistula Such infection is often associated with some stricture formation so that urinary symptoms are nearly always present The external openings are situated well forward in relation to the anus and there is no suggestion of any induration between the orifices and the anus

**Osteomyelitis**

Osteomyelitis of the ischium or ischio-pubic ramus may be responsible for a sinus situated in close relationship to the anus There may be no indication in the history as to the origin of this sinus and the absence of any palpable track leading to the anal canal may suggest a diagnosis of ischio rectal anal fistula Anal palpation may disclose some induration in the ischio rectal fossa but a perfectly normal anal canal may arouse the suspicion of the clinician Radiological examination should reveal the source of the infection

## DIFFERENTIAL DIAGNOSIS OF THE TYPE OF ANAL FISTULA

**Perianal Fistula**

There is a palpable track leading from the external orifice into the anal canal and the internal opening can often be identified There are no other indurated areas in the anal canal or in the surrounding tissue If the fistula is a high perianal one the track is not so easy to feel but in most cases it can be traced into the anal canal where the internal opening is palpable A probe passes obliquely into the anal canal

**Ischio Rectal Fistula**

This type of fistula may be hard to recognise particularly if it is horse shoe in nature because in such circumstances there is no way of comparing the degree of induration in one ischio-rectal fossa The external opening is situated often about five centimetres or more from the anus no fibrous track

can be palpated leading into the anal canal and a probe inserted into the external orifice passes almost vertically upwards

**Submucous Fistula**

This fistula can usually be appreciated by anal palpation but if considerable induration is present it may be almost impossible to distinguish it from a blind internal fistula penetrating deeply into the sphincter musculature

**Rectal Fistula**

The external opening may be situated at some distance from the anus whilst a probe passes directly into the rectum above the ano rectal ring The site of the internal opening is marked by the presence of granulation tissue on the reetal mucosa

## DIAGNOSIS OF TUBERCULOUS ANAL FISTULA

The patient with a tuberculous anal fistula is usually a proven tuberculous subject The fistula may follow the appearance of a relatively painless lump The discharge is thin and moderately profuse The external orifice is relatively large with ragged discoloured undermined edges and palpation discloses little induration (Fig 96) Tubercle bacilli may be identified in the discharge and tuberculous granulation tissue recognised on biopsy examination



FIG 96
External opening of tuberculous anal fistula in patient with active tuberculous lesion of lung

## TREATMENT OF ANAL FISTULA

The treatment of an anal fistula presents a challenge to the surgeon The recurrence rate is high the stay in hospital prolonged the financial burden heavy and the penalty of ill judged surgery may be a colostomy

If the fistula should enter the upper end of the anal canal the unwary surgeon may divide the ano rectal ring with disastrous effects on the anal sphincteric and supportive functions On the other hand should the timid surgeon unfamiliar with this region miss the important fistulous track recurrence is inevitable Further, the ischio rectal fistula with an internal opening *above* the ano rectal ring an exceedingly difficult condition to treat is often the end result of poor surgery

An anal fistula results from failure of an abscess in this region to heal by what Milligan called third intention that is to say by adherence of the walls of granulation tissue It is common experience to see suprapubic vesical fistulae and caecal fistulae close without assistance But this is uncommon with the long and relatively narrow anal fistulae because the granulation tissue comes together along the fistulous track to form pockets and these become the source of recurrent sepsis and persistent discharge

Ano rectal wounds heal well by second intention however and an anal fistula can be cured by laying open the fistulous track and converting it into a flat wound The fistula is incised along its whole length with complete division of all the overlying tissues from external to internal opening The overhanging skin edges are excised so that a flat wound is obtained

A superficial perianal fistula (a subcutaneous anal fistula or fistulette) presents no difficulty because the overlying tissue contains practically no muscle Similarly the tissue which overlies a submucous anal fistula is practically free of muscle

To cure the typical perianal fistula the functionally unimportant subcutaneous external sphincter muscle and a small portion of the internal sphincter muscle are all that need be divided so that this type of fistula can be converted into a flat wound without the division of any important muscle and the surgeon therefore has no fear of leaving any sphincter weakness His chief concerns are the identification of the whole of the track of the fistula at operation and the prevention of recurrence by ensuring that the wound remains flat and does not form bridges and pockets and revert to third intention healing

High perianal and ischio rectal fistulae are more difficult problems The main track usually enters the anal canal at its upper part in the posterior segment just below the ano-rectal ring the tracks are often curved horseshoe or semi horseshoe in shape One of the most important steps in the operation is the determination of the exact relationship of the internal opening to the ano rectal ring The ano-rectal ring must not be divided under any circumstances A probe passed along the main track into the anal canal will be felt to lie just below the ano-rectal ring *but it requires courage to cut all the* muscles down to the probe when the internal opening lies near that important level

**The Ano rectal Ring must not be Divided**

The ano rectal ring must be preserved  If there is any uncertainty at all about the relationship of the internal opening or of the track to the ano rectal ring  the tissues must not be completely divided at the initial operation  The probe is passed into the anal canal  the overlying tissues partially divided and the probe partly liberated  but the operation must not proceed further if there is any doubt  Repeated examinations in the convalescent phase will decide the true relationship of the opening to the ano rectal ring  This opening can be identified more easily in the post operative phase by loosely inserting a ligature down the track and through the internal opening and leaving it in situ  It seems that most of the external and internal sphincter muscles may be cut with relative impunity

**Management of the Wound Remaining after Excision or Incision of the Fistula**

The fistula is not necessarily excised  on the contrary  it is usually simply incised leaving the walls intact  After the fistula is laid open the wound which remains is large  the surgeon aims to have the wound as flat as possible and free from projecting tissue and pockets  To lay open the fistula and leave a flat wound may prove relatively easy  But the subsequent management of the wound may well determine whether or not the fistula will recur  The surgeon has three alternatives from which to choose

1 The Wound may be Sutured —The wound is searched for secondary tracks  the granulation tissue curetted off the walls of the track which has been laid open and the wound sutured  With the availability of chemotherapy and antibiotics the method has been advocated more strongly

It is unsound however  It is unsound because haemostasis after excision of the fistula is difficult and haematoma formation  no matter how small  must be the rule rather than the exception  A contaminated haematoma will cause infection and infection a recurrence of the fistula  The most intensive course of antibiotic therapy will not abolish contaminating organisms completely  Therefore  although the edges of the wound will heal by first intention  the patient cannot be guaranteed that the fistula will not recur

Primary suture is unsound for another reason  Exploration of the depths of the wound for secondary tracks is rendered more difficult if the edges of the wound have not been cut away  if the edges are cut away the skin must be approximated under tension  This is an unwise practice  particularly if there is unduly heavy contamination of the wound

The method is unsound for a third reason  An internal opening is not always identified with certainty  If the internal opening escapes incision and the wound is treated by primary suture  recurrence of the original fistula is certain

2 The Wound may be left to Heal by Second Intention —This is the standard operation  prior to the introduction of chemotherapy it was the

only safe method The fistulous track is incised and the overhanging edges of the wound trimmed so that it is as flat as possible in an ischio-rectal fistula a considerable amount of tissue must be excised and the resulting wound is very large The wound is dressed in such a way as to prevent the edges falling together when the patient is taken off the lithotomy position The wound is covered by granulation tissue within seven to ten days and epithelium can be seen growing in from the edges over the granulation tissue between the tenth and fourteenth days The surgeon cannot relax his attention on the wound a granulating wound is a contracting wound and this may be responsible for the formation of pockets which become engulfed in the fibrous tissue and undo all the good that has been done at the operation The most difficult part of the wound to observe is the anal portion the perianal skin especially if redundant, tends to fall over the wound and so the surgeon must cut it away generously to allow him to keep a particularly careful watch on the less accessible anal end of the wound Moreover free excision of the perianal skin prevents the formation of a ridge of tissue such a ridge forms the lower edge of a deep pocket and a deep pocket at the anal verge may lead to a blind internal fistula

Therefore the major disadvantage of this method is the need for a relatively large wound which may take several weeks or more to heal

3 THE WOUND MAY BE SKIN GRAFTED IMMEDIATELY OR WITHIN A FEW DAYS —The most satisfactory method of treating wounds such as these is to apply a thin sheet of skin as a graft The fistula is treated in the same way as it would be if it was intended to leave the wound open to heal by second intention A sheet of thin split thickness' skin is taken from the leg or arm and after haemostasis has been secured in the anal wound the graft is applied and firmly secured in position The graft is inspected on the fourth or fifth day in most cases the graft 'takes completely and the wound is healed or nearly healed within a week Even if the graft is only partially successful wound healing is hastened If the whole graft should slough no harm has been done the wound is treated as though no graft had been applied and is allowed to heal by granulation tissue If after excision of the fistula particularly a complicated fistula haemostasis is unsatisfactory no attempt should be made to graft the wound as a primary procedure It is dressed with dry gauze and the patient is returned to the theatre in two or three days time and a delayed primary graft applied there is no visible granulation tissue by this time and after gently washing away the initial dressings and blood clot the wound has the appearance of one freshly made

## TREATMENT OF PERIANAL FISTULA

On admission to hospital the patient may be given an enema in order to obtain a good evacuation of the colon and so avoid the necessity of a bowel action in the first few days after the operation The easy going phlegmatic

individual has little trouble in controlling his bowels for the desired period post-operatively and may not need an enema

A light diet is prescribed and is continued into the post-operative period until the bowels have opened this avoids the accumulation of excess faecal material within the colon

An intestinal sulphonamide (succinylsulphathiazole May & Baker) is ordered before the operation The prescription for the tablets is given to the patient when the decision is made in favour of operation and the patient starts taking the tablets five days before admission to hospital the dose of succinylsulphathiazole prescribed is 2½ g four times daily This intestinal sulphonamide reduces the bacterial content of the colon and the rectum and it is hoped that the more virulent organisms are destroyed so favouring wound healing

The patient is admitted on the evening prior to the operation and is shaved A pubic shave prevents blood clotting in the hair but in the majority of fistula operations this is not a potential source of discomfort it is an unnecessary preliminary for fistulae in the posterior half of the anal canal but for large fistulae and for those situated anteriorly it may be required If a skin graft is contemplated the thigh or arm should be shaved in readiness

## Operation

After anaesthesia has been induced the patient is placed in the lithotomy position and following preparation of the skin sterile drapes are applied (Fig 60)

A probe small enough to enter the fistula opening is selected and passed gently along the track into the anal canal If the external opening of the fistula has closed the track should be first exposed by an incision over the indurated part

The relationship of the probe to the ano rectal ring is determined In most cases it is clear that the probe is well below this level in which case the operation can proceed The overlying tissues are divided by sharp incision and the probe is liberated (Fig 97 A B C) The edges of the wound are cut away and the vertical sides replaced by sloping ones which are made as smooth as possible and free from pockets and projecting tissues Secondary tracks are sought and laid open The unhealthy granulation tissue in the roof of the fistulous track is curetted away The wound is given a triangular shape by removing skin from the outer end The subsequent management of the wound depends on whether the surgeon elects to leave it open to heal by second intention or whether he decides to apply a skin graft

### 1 Healing by Second Intention

If the surgeon decides in favour of healing by second intention he proceeds to dress the wound with gauze Petroleum jelly gauze is preferred by some but it tends to cover the wound with a film of petroleum jelly under which

organisms may be responsible for multiple small pockets of sepsis Dry gauze is better and it should be lightly packed into the wound the purpose of this dressing is to keep the edges of the wound apart and it is not necessary for it to be pressed firmly into position The whole is covered with a pad of

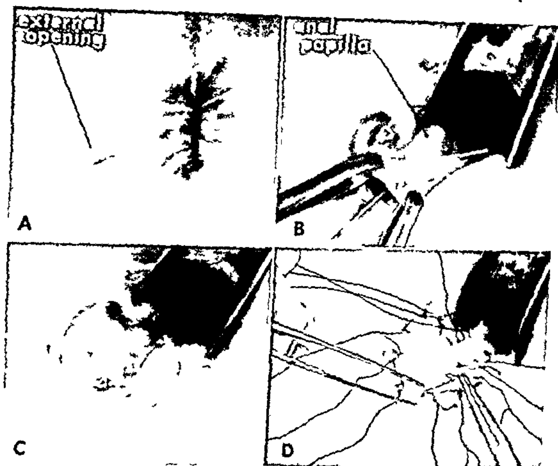



Fig 97
Perianal fistula
A—External opening in right posterior quadrant of perianal region
*B—Internal opening demonstrated at level of anal papillae*
C—Track laid open edges trimmed and wound enlarged at its outer end
D—Free skin graft sutured into position with 4 0 Mersilk *threaded on No 16 half-circle needle Ends of the ligatures left long*

wool which can be changed as *often as is required* by the nursing staff the deeper dressings are left *undisturbed*

*The patient is returned to the ward Morphia is required for pain and* restlessness as the effects of the anaesthetic wear off Some patients have difficulty with *micturition after operation* but this nearly always responds *to simple measures such as standing out of bed to void* so that catheterisation is rarely necessary

*The first dressing is done* on the third day after operation following the first bowel action The dressings applied at the time of operation usually

come away with this bowel action The wound is irrigated with Eusol and then re-dressed with dry gauze lubricated at one corner with a water soluble lubricant the lubricated corner is inserted along the fistula wound and well into the anal canal If the bowels have not acted by the fifth day after operation despite the administration of aperients an enema is given and the

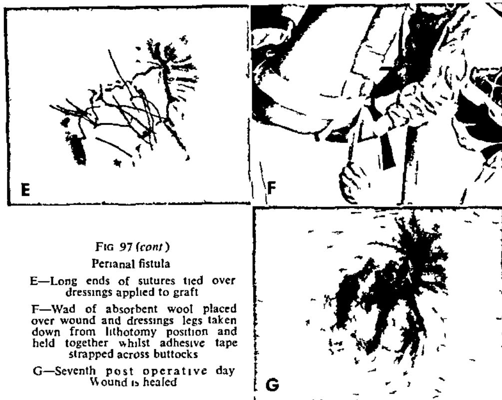



FIG 97 (*cont*)
Perianal fistula
E—Long ends of sutures tied over dressings applied to graft
F—Wad of absorbent wool placed over wound and dressings legs taken down from lithotomy position and held together whilst adhesive tape strapped across buttocks
G—Seventh post operative day Wound is healed

dressings are done after this has been returned By the end of the first week after operation a daily routine is developed after breakfast the patient opens his bowels has a bath returns to bed for irrigation of the wound and dressings and is then comfortable for the rest of the day

By the seventh day granulation tissue has appeared at many different spots in the wound and by the tenth day the whole wound is covered Soon after epithelium can be seen advancing inwards from the edges The surgeon must watch the wound intently to avoid pocketing or bridging in the anal portion There is a tendency to place the dressings on the part of the wound that can be seen whereas actually the most important part of the wound is that which cannot be seen and which lies in the anal canal it is difficult for the nursing staff to appreciate this and therefore the surgeon himself should do the dressings as often as possible

It is only when the wound can be seen in its entirety that is to say it is only when the anal portion has healed that it is possible for the surgeon to permit the patient's discharge from hospital But the wound should be kept under observation until it is healed completely

This method of treatment has disadvantages The operation itself takes but a few minutes but the post-operative treatment is prolonged It is unwise to discharge the patient early so that the usual period in hospital is about two or three weeks and it takes as long again for the wound to heal completely Dressings for the first seven to ten days are uncomfortable to the patient despite the gentlest handling by the surgeon The fibrosis consequent upon a wound healing by second intention complicates a second operation should it prove necessary Surgeons in the past endeavoured to shorten the convalescence by applying skin grafts usually in the form of pinch grafts in the post operative period (Gabriel 1927 Wright 1934 35) It means interrupting the ambulatory state of the patient for five or six days and the 'take' is not always satisfactory

## 2 The Application of a Primary Skin Graft

A method that has proved very satisfactory in practice is the application of a free 'split thickness' graft at the time of the initial operation (Hughes 1952 1953 1954)

The operation proceeds in the same way as before The fistula is excised and the edges are fashioned and haemostasis is secured

A thin sheet of skin is cut from the inner aspect of the left thigh which is the most accessible for the purpose (Fig 60) The skin should be cut thin It is transferred to the wound and sutured to the edges with fine black silk (size 4/0 Mersilk) threaded on small half-circle needles (size 16) The ends of the sutures are left six inches long (Fig 97 D) Saline is flushed under the graft to remove all blood clot (Fig 98) a piece of tulle gras is applied to the surface of the grafted wound and small pieces of cotton wool previously moistened with saline are placed very firmly in position to keep the graft immobilised The long ends of the silk sutures are tied over the back of the dressings which are moulded into the wound (Fig 97 E) Further security is obtained by placing a strip of gauze in the anal canal over the top of the fistula dressing and the buttocks are strapped together over a piece of absorbent cotton wool after the legs have been taken down from the lithotomy position (Fig 97 F)

The patient is not permitted to get out of bed in the post-operative period although in certain cases it is possible to allow him to stand to void if there is difficulty with micturition He is advised to be careful when moving about in bed as a further precaution against the graft shifting position

Morphia is given for the first twenty four hours but as a rule little analgesic is necessary unless the patient is apprehensive or is having painful

spasms of the sphincter muscle  A light diet is ordered and the bowels are kept confined

The first dressing is done on the fourth post-operative day  a day or two later if the patient is quite comfortable  The strapping is removed  the absorbent

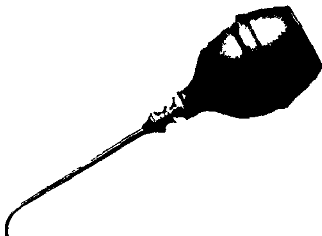


Fig 98
Dental chip syringe used for syringing saline under skin graft to remove clot prior to application of dressing



A  B

Fig 99
A—Perianal fistula (right lateral position)
B—Perianal anal fistula excised and grafted  Wound healed on seventh post operative day

cotton wool released and the piece of gauze in the anal canal is gently removed  The sutures tied over the fistula dressings are cut and the pieces of cotton wool packed into the wound are removed piece by piece  Finally the tulle gras

is lifted off the graft and in most cases it is found that except perhaps for the edges the wound is healed (Figs 97 G 99 A B) The whole is painted with *ten per cent mercurochrome* any overlapping edges of the graft are cut away and a single piece of cotton wool snugly inserted over the grafted area

The patient resumes a normal diet and the bowels are allowed to act The patient gets out of bed and on the seventh day has a bath and is allowed home

Antibiotics are not necessary and should be avoided unless there is some special indication for their administration

After excision of a large fistula it may be difficult to control haemorrhage sufficiently to justify placing a graft on the wound immediately In such circumstances a *delayed primary skin graft* is advocated The initial wound is dressed with dry gauze and is left undisturbed for three days when the patient is returned to the theatre Under general anaesthesia the dressings are removed and the wound inspected adherent blood clot is washed away and tissue of doubtful viability is removed with scissors A graft is then applied to the wound The wound is dressed on the fourth day and the bowels allowed to act after a total confinement of seven or eight days

## TREATMENT OF ISCHIO RECTAL (ANO RECTAL) FISTULA

The principles underlying the treatment of ischio rectal (ano-rectal) fistulae are the same as those which govern the treatment of smaller fistulae But there are features which are peculiar to ischio rectal fistulae

### 1 Complicated Course of the Ischio Rectal Fistula

The usual ischio rectal fistula has three main component parts each coursing in a different direction The main track in the ischio rectal fossa runs horizontally the track which leads from the external opening to the main track is more or less vertical whilst the short track leading from the internal opening passes backwards to meet the main track at a right angle It may or may not prove possible to manipulate a probe from the external opening through the internal opening into the anal canal and rectum

### 2 The Depth of the Ischio Rectal Fistula

The part of the track in the ischio-rectal fossa lies very deeply and owing to the sloping direction of the levator ani muscle it extends well above the level of the ano-rectal ring The anterior extremity of this part of the track passes deep to the transversus perinei muscle and the triangular ligament (Figs 89 100) Posteriorly the track lies at the level of the coccyx The usual way to improve exposure in a deep wound is to extend the incision but such extension is limited here by the ischial tuberosities the coccyx the pubis and by the presence of the anal canal and rectum with their sphincter muscula

ture However the wound is widened as much as these boundaries will permit and the edges of the wound made to slope towards the depth

### 3 Proximity of the Internal Opening to the Ano Rectal Ring

The track which leads from the internal opening to the posterior communicating portion of the ischio rectal track lies very close to the ano-rectal ring and the small amount of muscle which remains after it has been laid open might disturb the surgeon

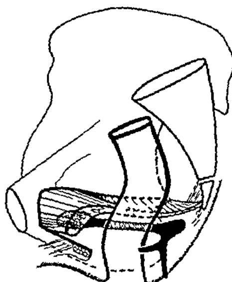


Fig 100
Ischio rectal (or ano rectal) anal fistula Anterior extension of ischio rectal part of track shown extending above triangular ligament

### 4 Danger of Injury to the Rectum above the Ano Rectal Ring

The rectum above the ano rectal ring is capacious and the lumen is separated from the ischio rectal portion of the fistulous track by only a thin layer of tissue Unless the surgeon is particularly careful the rectum is liable to be injured and the resulting rectal fistula might defy all attempts at cure A rectal fistula is nearly always the end result of such an operative mishap (Fig 101)

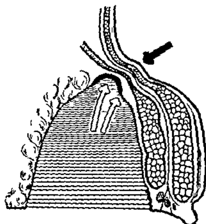


Fig 101
In depth of ischio rectal anal fistula wound rectal wall may be punctured unless surgeon is careful

### 5 Extension through Levator Ani Muscle

From the ischio rectal portion of the track there may be an extension upwards which disappears from view through the levator ani muscle This portion of the fistula need not receive attention because it will heal spontaneously after the main fistulous track has been laid open (Fig 105)

### 6 Blood Loss during Operation

The extensive incision necessary to lay open this fistula may result in a considerable loss of blood The condition of the patient requires a special check during the long operation and if the blood loss appears excessive it should be replaced without delay

## 7 Length of Operation

Operations for ischio-rectal fistulae are time-consuming procedures By the time the fistula has been laid open and the wound trimmed and a skin graft applied to the surface three or four hours or even more may have elapsed It is not possible to proceed faster and attempts to do so might well prove disastrous

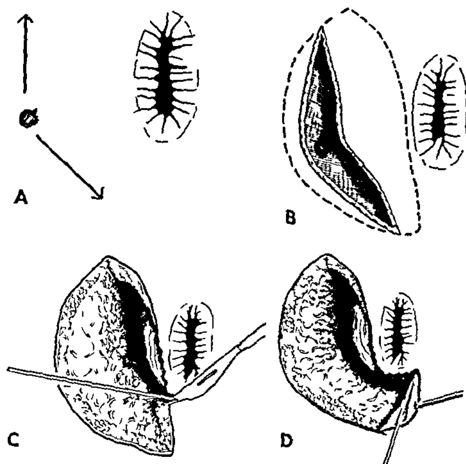



FIG 102
Ischio rectal anal fistula

A—Arrows indicate direction of incisions from external opening

B—External opening laid open and skin within dotted area removed to improve exposure

C—Right ischio rectal track laid open A probe passes into posterior communicating track

D—Posterior communicating track laid open Probe enters ischio rectal track on left side

## 8 Prolonged Stay in Hospital

After an ischio-rectal fistula has been laid open the large wound which remains will take weeks to heal by granulation tissue Naunton Morgan (1949) reviewed the St Mark s Hospital figures and found that the average

time in hospital for all such cases so treated was eight weeks whilst in approximately one third it was ten weeks or more

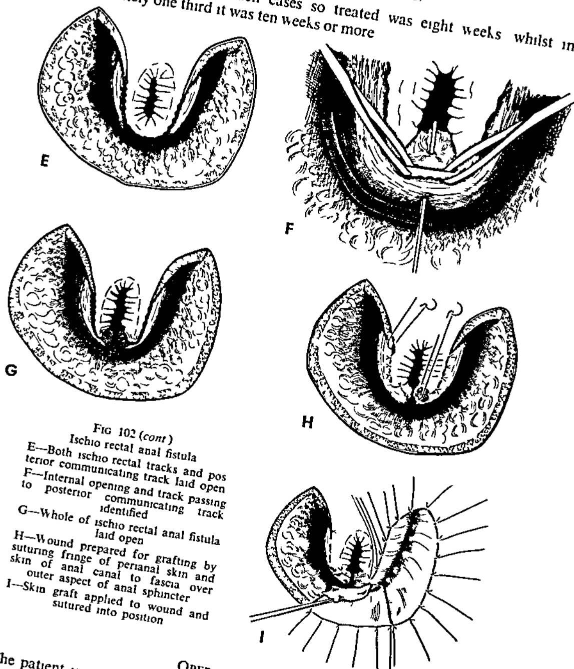



FIG 102 (*cont*)
Ischio rectal anal fistula
E—Both ischio rectal tracks and posterior communicating track laid open
F—Internal opening and track passing to posterior communicating track identified
G—Whole of ischio rectal anal fistula laid open
H—Wound prepared for grafting by suturing fringe of perianal skin and skin of anal canal to fascia over outer aspect of anal sphincter
I—Skin graft applied to wound and sutured into position

## OPERATION

The patient is prepared for operation in the same way described for the perianal fistulae Both thighs should be shaved because a large amount of skin may be necessary to cover the wound Blood should be taken for typing and held for cross typing in case transfusion is required

As the patient will be held in the lithotomy position for several hours it is important that the posture should be comfortable For this purpose the Lloyd Davies abdomino perineal stirrups are admirable

There are three stages in this operation the first involves laying open the fistulous tracks the second the preparation of the wound for grafting and the third the application of the graft

**Laying Open the Tracks of an Ischio Rectal Fistula**

A probe is passed into the external opening and a finger inserted into the anal canal and rectum to ascertain the relationship of the tip of the probe to the ano rectal ring The external orifice is enlarged with the scalpel and the incision extended forwards and backwards (Fig 102 A) anteriorly the incision should reach in the first place the level of the anterior margin of the anus and posteriorly a point about half way between the tip of the coccyx and the posterior margin of the anus This incision is deepened through the ischio-rectal fossa to expose the track indicated by the probe (Fig 102 B) A finger must be inserted repeatedly into the rectum if injury to this viscus is to be avoided The incision is then extended forwards or backwards as is necessary and to obtain better exposure the edges are cut back to give a sloping wall (Fig 102 C) To reach the anterior limit of the ischio rectal track it is nearly always necessary to cut the inferior haemorrhoidal vessels and not uncommonly a portion of the transversus perinei muscle The portion of the ischio rectal track curving into the posterior communicating space may be difficult to follow and assistance can often be obtained by inserting a probe into the internal opening and after ascertaining the relationship of the probe to the ano rectal ring cutting through the superficial sphincter musculature down to the probe This will leave then only a very short portion of the track to find and lay open (Fig 102 D-G)

Extension to the opposite side is most carefully sought because induration in the ischio rectal fossa is not always easy to appreciate and it must be remembered that unilateral horseshoe fistulae are not as common as those with bilateral extensions When found it is laid open by cutting all the over lying tissue

**Preparation of the Wound for Skin Grafting**

When the ischio rectal fistulous track has been laid open and the walls sloped away as much as possible to render the depths of the track more accessible the wound should be prepared for grafting The outer walls of the wound need no special attention In the floor of the wound the remainder of the fistulous track is curetted of unhealthy granulation tissue The inner walls of the wound formed by the outer aspect of the anal canal are particularly unsuited for grafting because of the ragged nature of the cut perianal tissue However good advantage can be taken of a layer of fascia which covers the outer aspect of the anal sphincter muscle The fringe of perianal

skin which remains after laying open the fistulous track is sutured to the fascia with fine interrupted plain catgut so excluding the irregular vascular perianal space as a surface for grafting The same manoeuvre is adopted along the depth of the incision through the sphincter musculature extending from the perianal skin to the internal opening the skin of the anal canal and the fascia covering the outer aspect of the anal sphincter muscle are sutured together with interrupted plain catgut over the ragged edges of the cut sphincter muscle (Figs 102 H 104 B C)

**Skin Grafting the Wound**

Fine instruments are needed for this phase of the operation which is the longest and the most tedious

Sheets of skin are cut from the inner aspect of the thighs the graft should not be taken from the posterior thigh because of the discomfort this causes in the post operative period The skin should be cut thin and the individual sheets kept large The donor site should be kept covered with a moist pack and not dressed until the conclusion of the operation because it might be necessary to obtain more skin

The sheets of skin should be sutured in place with fine black silk (4/0 Mersilk) threaded on small half-circle cutting-edged and round bodied needles (No 16) The ends of the individual sutures are cut long to help anchor the dressings into place at the conclusion of the operation The whole wound is covered with these sheets of skin and to prevent their displacement when the dressings are applied individual sheets are sutured to one another in the depths of the wound (Figs 102 B 103) Blood clot collecting under the graft is removed with saline flushed under the graft from a dental chip syringe A layer of tulle gras is applied to the surface of the grafted wound and over this are laid strips of cotton wool moistened in saline these cotton wool strips are gently but very firmly pressed into the wound and are finally held in place by the lengths of black silk sutures tied across the surface

Cotton wool pads are placed over the perineum and further support given to the graft by adhesive strapping and crepe bandages The patient is lifted from the operating table into bed so maintaining more or less the posture when the dressings are applied

**Treatment following Operation**

Morphia is given for pain and restlessness The patient is nursed with the legs slightly flexed at thighs and knees There is surprisingly little difficulty with voiding from this position but in a female patient a catheter may be necessary to keep the dressings dry

A light diet is allowed the bowels are kept confined Penicillin and streptomycin are given because of the extent of the wound but the value of these antibiotics is limited and they should not be used to cover poor surgery

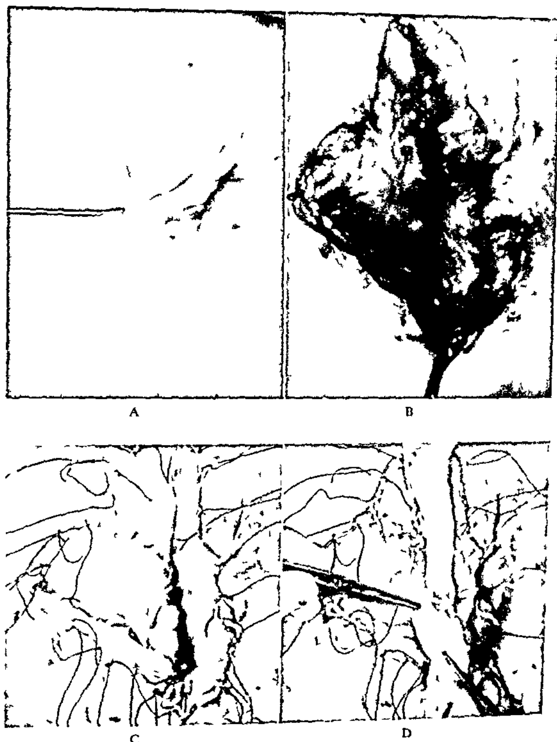
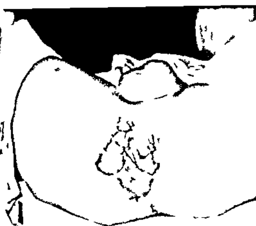



FIG 103
Ischio rectal anal fistula
A—External opening Considerable scarring on outer side
B—Unilateral track laid open
C—Wound covered with skin graft
D—Graft is kept in position by layers of cotton wool soaked in saline



E



F



G



H

FIG 103 (*cont*)
Ischio rectal anal fistula
E—Long ends of silk sutures tied over dressings
F—Appearance immediately prior to removing patient from lithotomy position Donor site on left thigh has been bandaged
G—Wound on seventh day after primary skin grafting Practically completely healed
H—Wound twelve months after operation

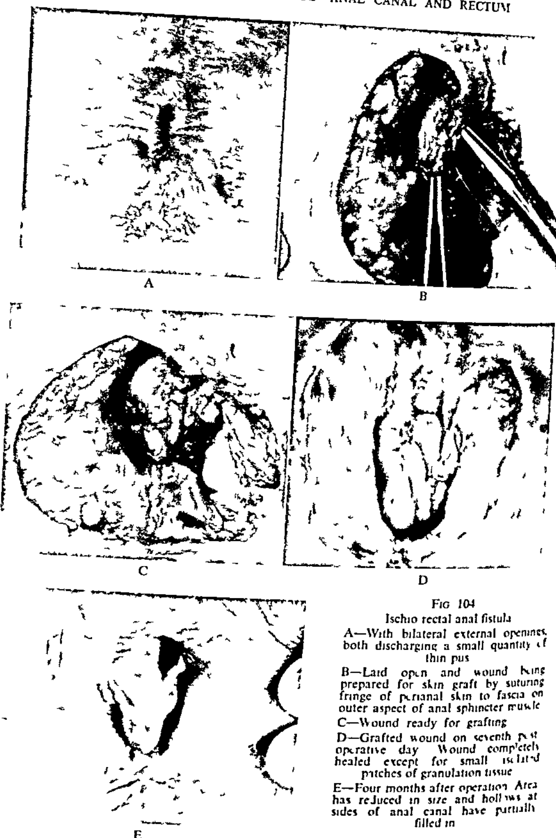



Fig 104

Ischio rectal anal fistula

A—With bilateral external openings both discharging a small quantity of thin pus

B—Laid open and wound being prepared for skin graft by suturing fringe of perianal skin to fascia on outer aspect of anal sphincter muscle

C—Wound ready for grafting

D—Grafted wound on seventh post operative day Wound completely healed except for small isolated patches of granulation tissue

E—Four months after operation Area has reduced in size and hollows at sides of anal canal have partially filled in



Fig 105
Right sided ischio rectal anal fistula (left lateral position) six months after primary grafting Cavity has become more shallow with passage of time Fistula had an extension through levator ani muscle but healed spontaneously after main track was removed



Fig 106
Ischio rectal anal fistula (right side) fourteen months after operation No mucosal prolapse

The dressings are not disturbed for five to seven days the actual time depending on the appearance of the dressing or the restlessness of the patient The first dressing is done in the lithotomy position in the theatre An anaesthetic is not necessary but adds to the patient s comfort The sutures are cut and the dressings gently lifted out of the wound An almost complete 'take of the graft is usual although patchy areas might escape along the edges of the individual sheets of skin All sutures are removed and loose pieces of skin cut The whole wound is swabbed with mercurochrome ten per cent and lightly dressed with tulle gras and cotton wool

The patient is allowed a full diet and the bowels permitted to act A dressing is done each day by the surgeon occasionally sutures overlooked at the first dressing appear in the wound and small pieces of loose skin are trimmed away if the passage of a few days shows that they have not taken The patient is allowed to the bath on the tenth post-operative day By the fourteenth post operative day the graft has consolidated and the patient is allowed to leave hospital It is advisable to keep a pad of cotton wool over the wound for a week or two and contraction exercises of the levator ani and remaining sphincter muscles should be encouraged (Figs 103 G 104 D 105 106)

## TREATMENT OF SUBMUCOUS ANAL FISTULA

The submucous anal fistula differs from the previous anal fistulae discussed in that no sphincter muscle is divided when the fistula is laid open The submucous fistulous track may be a long one extending well into the rectum with the upper end out of reach of the probe But so long as the track below the ano rectal ring is destroyed the patient will be relieved of symptoms A persistent track above the ano-rectal ring closes spontaneously and remains closed but in any case discharge collecting above the ano rectal ring will not trouble the continent patient

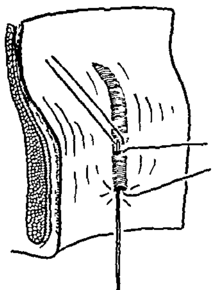


FIG 107
Treatment of a submucous anal fistula Track can be laid open in sections To avoid primary haemorrhage overlying tissue ligated on either side prior to division

### OPERATION

The patient is prepared in the same way as for operation on other anal fistulae

After the patient has been anaesthetised and placed in the lithotomy position the anal canal is gently dilated A probe is passed through the lower opening and along the track To free the probe entails an incision in the vascular mucosa and the resulting haemorrhage may be difficult to control For this reason a ligature is threaded down the fistulous track and is tightly tied on one side of

the track a second ligature is tied on the other side and the fistula laid open by cutting between the ligatures (Fig 107)

No special post operative management is needed but the patient must be observed for secondary haemorrhage in the second week after operation

## TREATMENT OF RECTAL FISTULA

Fortunately this type of fistula is most uncommon because it cannot be treated by the methods employed for the anal fistulae To lay open this fistula the whole of the sphincter musculature must be divided and this is not permissible

The patient should be observed for a period of time and operation advised only if the symptoms warrant it The writer has had no experience in the surgical treatment of this type of fistula because none of the three patients under his care has demanded surgical treatment

## COMPLICATIONS OF THE TREATMENT OF ANAL FISTULA

### 1 Recurrence of the Fistula

This is the most common complication The chief reason for recurrence is probably incomplete excision of the fistulous track whilst a second cause for failure is to be found in the convalescent period when a wound is healing by second intention

If the excision has been incomplete and the wound has been skin grafted the resulting recurrent anal fistula will be small and can probably be laid open under local anaesthesia If the wound has healed by second intention the remaining fistulous track is buried under the granulation tissue and the recurrent anal fistula will be similar to the one for which the initial operation was performed

If the excision of the fistula has been complete and the surgeon elects to treat the wound by the open method he must watch it carefully to ensure that the wound remains flat and that it heals evenly from the edges

### 2 Incontinence

Although the anal sphincters can be divided almost completely without apparently interfering with the continence of the patient there are some who are left with a permanent weakness which might prove a serious handicap

The subcutaneous external sphincter and part of the internal sphincter muscles can be divided with impunity in all patients In many others the subcutaneous and superficial components of the external sphincter muscle together with part of the deep external sphincter muscle and the related part of the internal sphincter muscle can be divided without impairing rectal continence although most of these patients are conscious of a weakness when the motions are loose for any reason Division of the puborectalis

muscle will leave the patient incontinent Before embarking on any operation involving division of the anal sphincters the surgeon and the patient must be appreciative of the necessity for the operation together with the possible outcome If there be any doubt in the surgeon s mind at the time of the operation as to the safety of dividing the muscular tissue superficial to the probe he must not proceed

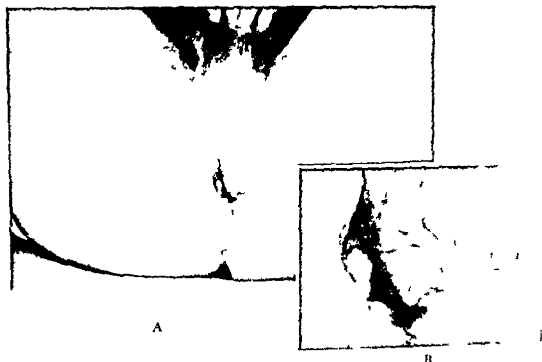



FIG 108
Ischio rectal anal fistula
A—Fifteen months after excision and primary skin graft
B (inset)—Close up view to show mucosal prolapse after operation this was symptomless

In the writer s experience it is safe to divide the amount of sphincter muscle necessary to cure an ischio rectal anal fistula There is some appreciable weakness at first but within two or three weeks continence has without exception proved adequate In Cheseldon s *Anatomy* (1713) (reviewed by D Arcy Power in 1929) the same observation was made It seems that other surgeons have been less fortunate however because several manoeuvres have been described to minimise incontinence Gabriel (1949) suggested that the internal opening be laid open at a separate operation by allowing two weeks to elapse between the two operations he hoped that the fibrosis which develops in this time would stop retraction of the sphincter muscle Thorgerson (1937) favoured a mucosal flap to close the internal orifice in the belief that it would avoid the need for laying open that part of the track which passes through the muscle

If division of the sphincter muscle produces a persistent incontinence an attempt should be made to repair the muscle  In most instances it is necessary to suture the divided ends of the puborectalis muscle as has been successfully practised by Raven (1948) and others

### 3 Prolapse of the Rectum

Division of the ano-rectal ring is a catastrophe which results not only in rectal incontinence but may also cause a complete prolapse of the rectum Partial prolapse of the mucosa is not uncommon after radically dividing the sphincter below the ano rectal ring  this partial prolapse may be responsible for anal discomfort with defaecation and an irritating mucous discharge (Fig 108 A B)

If a complete prolapse has followed division of the ano rectal ring an abdomino perineal repair with suture of the levator ani muscle should be performed  if a partial prolapse of the mucosa has followed a section of the anal sphincter muscle no treatment may be required but if symptoms are troublesome it will be necessary to reconstruct the anal musculature

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*Chapter Eigh*

# SINUSES RELATED TO THE ANUS

SINUSES leading to cavities lined by granulation tissue may be found in close relation to but without connection with the anus or anal canal The sinuses under consideration are distinct from the blind external anal fistula

## PILONIDAL SINUS

In 1880 Hodges suggested that the term pilonidal sinus' be used to describe the chronic sinus containing hair and found between the buttocks (*pilus* hair *nidus* nest) He thought that the basis of the condition was a congenital coccygeal dimple in which detached body hair and other debris lodged Three main viewpoints have been expressed concerning the origin of this remarkable condition

### 1 Congenital Origin

Until quite recently it was believed that these pilonidal sinuses were caused by some form of developmental anomaly This theory of origin was based on certain circumstantial evidence For example it is known that there is a connection between the skin and neural canal in early foetal life in the sacral region that in some young individuals deep sinuses extend into the vertebral canal that sacrococcygeal dimples occur in some babes that the midline is the common site for congenital lesions and that hair is often to be found in the sinus

King (1947) after critical analysis of this evidence concluded that the congenital theory was untenable and this received special support from the observations of Patey and Scarff (1946) and others who described typical pilonidal sinuses in other parts of the body

### 2 Acquired Origin

It is now widely held that the fully developed pilonidal sinus is due to the intrusion of hair from the exterior Professor E S J King (1947) has given a concise description of the pathological changes that take place around these foreign bodies such as secondary infection and deep abscess formation Hueston (1953) suggested that enlarged hair follicles in the midline were the portals of entry for the hairs

### 3 Congenital and Acquired Origin

Haworth and Zachary (1955) have found congenital dermal sinuses in 1 4 per cent of 500 children examined by them until puberty these do not

cause symptoms and are not noticed. From the age of puberty, hair grows from the epithelial lined track, sebaceous glands become active, the buttocks enlarge and finally the orifice blocks and secondary infection develops. In his original description Hodges (1888) advanced a similar theory but suggested that the hair came from without rather than from the sinus itself.

## Surgical Pathology

One or more sinuses with pit-like external surfaces extend down to the main pilonidal cavity. This cavity has a longitudinal direction, is in the midline and is about five centimetres in length. It contains purulent and necrotic material. Hairs may or may not be present; they are usually in bundles composed of a dozen or more separate hairs of two or three centimetres in length, but sometimes finer and shorter hair occurs in isolated strands. The cavity is lined by granulation tissue and has dense fibrous walls. Epithelial elements and hair follicles in the pilonidal walls are very rare. Secondary tracks may extend laterally from the primary one and open on to the surface of the skin one or two centimetres from the midline.

## Clinical Features

Males are more commonly affected than females and the average age of onset is twenty-five years (Table V).

Table V
PILONIDAL SINUS
Author's series 1952-1955

| Number of cases | | |
|---|---|---|
| | Male | 41 |
| | Female | 7 |
| Total | | 48 |
| Average age of onset | | 25 years |
| Lowest age of onset | | 11 years |
| Highest age of onset | | 43 years |

The most common symptoms produced by the pilonidal infection are recurrent abscess formation, discharging sinuses and persistent discomfort. An abscess may develop over the lower end of the sacrum at the upper end of the natal cleft and this may be the first indication of the presence of the pilonidal infection. Such an abscess does not usually contain hair and after incision may subside completely. But in most cases recurrent abscess formation is the rule, often occurring in association with a discharging sinus. The pilonidal sinus may be single or multiple and may discharge a small quantity of purulent fluid; if the sinus obstructs an abscess follows. A persistent deep-seated discomfort accompanies the pilonidal infection and interferes with the patient's activities.

*Chapter Eigh*

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The lesion is so constant in its situation that it is difficult to overlook the congenital theory of origin with an acquired condition the local pathology might be more haphazardly arranged (Fig 109) One or more sinuses are

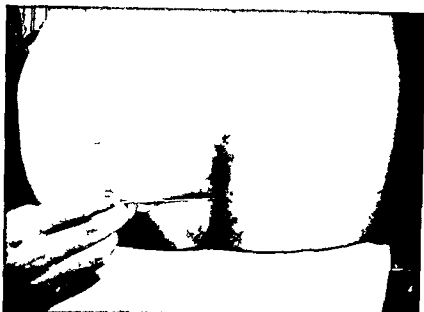
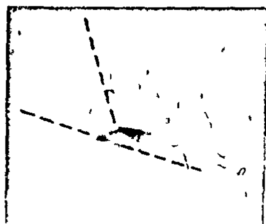


Fig 109
Pilonidal infections are situated in upper end of natal cleft When patient is sitting there is no pressure on this area





A Fig 110 B
Pilonidal sinus
A—Two tracks leading from external orifice
B—These laid open and wound skin grafted

situated in the midline (Fig 110) and have the appearance of small holes punched in the skin a fine probe can be introduced into a sinus and passed vertically down into the main granulation tissue lined cavity It is not uncommon to find a sinus opening on the buttock about an inch from the midline

the orifice of this lateral sinus is usually filled with granulation tissue unlike those in the midline The underlying induration extends a variable distance upwards but it is exceedingly uncommon for it to approach closer than three or four centimetres to the posterior margin of the anus

## TREATMENT

Although this lesion is not a serious one the discomfort which it causes is usually sufficient to justify operative treatment Once the *pilonidal infection* has developed conservative treatment is unlikely to prove successful

### Pilonidal Abscess

The abscess should be drained as soon as it has formed This can often be done under local anaesthesia and without the inconvenience caused by preliminary admission to hospital The incision should be placed in the midline and should be generous in length it must extend into the abscess cavity in the whole of its length and it should include sinuses situated in the midline The cavity should be inspected carefully for hair and other debris Thereafter the wound should be dressed each day In a number of cases no further trouble is experienced by the patient

### Pilonidal Sinus

1 SMALL SINUS —The *small sinus may* be completely excised together with the cavity into which it leads and the resulting wound closed by primary suture The operation is best performed with the patient lying on his left *side after a preparation similar* to that advocated for anal fistula An incision in the midline passes just to either side of any external sinus openings and is deepened into the subcutaneous tissue in close relation to the fibrous tissue *walls* A wide excision is unnecessary As the excision proceeds a careful watch is kept for unsuspected extensions These are easily seen and do not need a preliminary injection of dye such as methylene blue It is not necessary to dissect as deep as the fascia over the sacrum Following excision meticulous haemostasis is necessary No deep sutures are inserted and the wound is closed with interrupted silk sutures passed deeply into the tissues Dressings are maintained in position with the aid of adhesive strapping The patient is kept in bed until the sutures are removed on the seventh post operative day

Following this operation some *superficial wound infection* is not un common but does not appear to be of any consequence Deep wound infection is unusual and may signify an incomplete removal of the pilonidal sinus Haematoma formation may *complicate the more* extensive excisions and be responsible for secondary infection If any of the track is left behind the resulting recurrent sinus will be much the same size as the original (Fig 111)

2 LARGE AND EXTENSIVE SINUSES —Excision and primary suture is not a satisfactory procedure for the more extensive cases which extend half way

up the dorsum of the sacrum and laterally into the neighbouring buttocks because the defect in the tissues after excision is too great to close by approximating the edges This can sometimes be achieved by *tying the ligatures* tightly and so forcing the edges of the wound together but closing any wound under tension is undesirable Furthermore although the skin edges might be apposed it is very difficult to obliterate the space deep to it This has been done by mobilising the gluteal fascia and by the use of rotation flaps but the writer does not believe that these more complicated procedures should replace simpler and perhaps more effective measures



FIG 111
Recurrent pilonidal sinus following two previous operations Scars of sutures used for primary closure can be seen This was treated successfully by laying open residual sinus and primary free skin grafting

**Excision of Pilonidal Sinus and Free Skin Graft**

The patient is prescribed the same pre-operative treatment given for anal fistula The operation is done preferably under general anaesthesia with the patient lying on his left side (When long gluteal extensions are present a prone position may be preferred ) The thighs are moderately well flexed A pack placed between the buttocks prevents soiling of the pubic hair with clotted blood

A fine probe is selected and inserted into one of the sinuses and with a sharp scalpel the tough overlying skin is incised and the probe freed The sinus cavity is exposed and the hair and debris are removed with a curette spoon The walls of the cavity are probed and the whole length of the sinus and any lateral extensions laid open The granulation tissue lining the cavity walls is removed with the curette spoon Haemostasis is secured with fine plain catgut ligatures No attempt is made to excise the walls of the sinus cavity (Figs 110 112 A B)

A series of interrupted sutures of fine chromic catgut or of fine silk is placed around the wound These sutures pass through the skin *and may*

include the edge of the incised sinus cavity so completing the marsupialisation although this is not essential and is only possible if the sinus cavity approaches the surface A sheet of thin skin is cut from the uppermost surface of the right thigh after it has been laid over the wound it is held in place by tying the ends of the previously inserted interrupted sutures over the dressings super imposed on the graft Further protection to the dressings is given by carefully placed adhesive strips passing from one buttock to the other (Fig 112 C D)

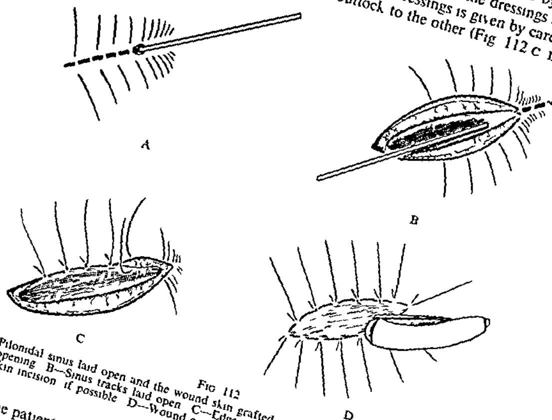



Fig 112

Pilonidal sinus laid open and the wound skin grafted A—Probe inserted into sinus opening B—Sinus tracks laid open C—Edges of sinus tracks sutured to edges of skin incision if possible D—Wound covered with skin graft wrapped over mould

The patient is nursed on his side and should remain in bed until the graft has been inspected If the sinus cavity contained pus chemotherapy is given in the post-operative period A normal diet is permitted and if the patient wishes to open the bowels he may do so If difficulty is experienced in voiding the patient may be gently assisted to his feet taking care not to disturb the dressing The graft is inspected on the fifth sixth or seventh day depending on the comfort or otherwise of the patient After the first dressing a small piece of cotton wool is all that is required

If the graft fails the wound is allowed to close in by granulation tissue and although it will take some weeks to heal it should prove possible to allow

the patient to return home after about fourteen days in hospital The skin grafted wound has not proved to be a vulnerable one because it is not a weight bearing area and is well protected

## PERIANAL PILONIDAL SINUS

Perianal pilonidal sinuses are uncommon and only a few cases have been reported The lesion is almost certainly an acquired one The usual type




Fig 113

A Mr B fifty two years Presented with discharging area on right side of anus which had been present for thirty years One sinus discharging and several others present but closed An underlying indurated area about five centimetres in diameter extended as high as level of ano rectal ring

B —Lesion excised on 25th August 1955 Dense fibrous tissue enclosed sinus tracks lined by granulation tissue and containing hair

C Sheet of skin cut from left thigh and sutured into wound

D Dressings removed on 29th August 1955 and ninety per cent of graft was intact

of perianal infection may be followed by a discharging sinus into which hair projects and which finally comes to lie free within the tracks these tufts of hair become responsible for a foreign body reaction and cause dense fibrosis

In the two cases treated by the writer the clinical features were similar both patients were males and both had had discharging sinuses for many years The patients were of dark complexion and locally hirsute and in both sinuses were situated in areas of very dense induration of irregular outline (Table VI)

TABLE VI

PERIANAL PILONIDAL SINUS

Author s cases

| *Case* | *Sex* | *Age* | *Duration symptoms* | *Situation* | *Treatment* | *Result* |
|---|---|---|---|---|---|---|
| 1 (R M H 163256) | M | 52 years | 30 years | Right lateral | Excision & skin graft | 90 take |
| 2 (R M H 146884) | M | 63 years | 40 years | Left lateral | Excision & skin graft | 70 % take |

The lesion should be excised and the large resulting wound covered with a free skin graft (Fig 113)

## CHRONIC SUPPURATIVE HIDRADENITIS

Chronic suppurative hidradenitis is the term given to infection of the cutaneous apocrine glands These glands are larger than the usual sweat glands and unlike them are concentrated in certain regions particularly the axilla groin scrotum perineum and anus Apocrine glands extend deeply into the subcutaneous tissue are found only in association with hair follicles and can actually be seen with the naked eye The clump of glands in the region of the anal orifice has been termed the anal organ (Woollard 1930)

It is not known how infection starts but once it is established other glands in the neighbourhood become involved with the formation of multiple foci of infection the centres of which break down to result in discharging sinuses with thick fibrous walls which coalesce with one another Ultimately the normal soft elastic skin and subcutaneous tissue are replaced by indurated chronically inflamed tissue over which are scattered numerous sinuses discharging thin purulent material (Fig 114) Individual sinuses may or may not communicate with one another or with the anal canal and rectum

The diagnosis can be made clinically when there is a relatively superficial chronic inflammatory lesion with considerable fibrous tissue reaction studded with multiple sinuses in one or more areas in which the apocrine glands are found

Non surgical measures such as vaccine therapy and chemotherapy ultra violet light superficial radiotherapy etcetera are ineffective For small isolated lesions incision and drainage is satisfactory




Fig 114

A—Mr H forty three years Abscess incised near anus fifteen months previously continued to discharge Subsequently other abscesses appeared and discharged spontaneously Patient in constant discomfort unable to walk any distance and forced to abandon work Extent of superficial lesion shown A number of discharging sinuses lead into tracks which may remain discrete or may intercommunicate

B Post operative view (twelfth day) to show consolidated grafted area In places where sheets of skin were not in good apposition there was delay in healing On inner aspects of both thighs are two isolated areas treated by simple unroofing Posterior perianal area is hidden from view

For advanced lesions nothing short of radical excision will cure the patient of the disease (Hughes & Kernutt 1954) The lesion extends to the deeper layers of the subcutaneous tissue and the incision must be down to this level The resulting wound may be very large and if it is allowed to heal by second intention will take weeks to close For this reason it is advisable to cover the wounds with free skin grafts The writer has done this operation on three occasions (Table VII) with a complete take in one patient and an almost complete take in the remaining two (Fig 114)

TABLE VII

SUPPURATIVE HIDRADENITIS

Author s cases

| *Case* | *Sex* | *Age* | *Duration symptoms* | *Situation* | *Treatment* | *Result* |
|---|---|---|---|---|---|---|
| 1 | M | 43 years | 1½ years | Bilateral | Excision & skin graft | 90 take |
| 2 | M | 22 years | 1½ years | Right lateral | Excision & skin graft | 90 take |
| 3 | M | 29 years | 2 years | Left lateral | Excision & skin graft | 100 ∘ take |

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*Chapter Nine*

# ANAL FISSURE (FISSURE-IN ANO)

AN anal fissure is a triangular ulcer situated at the anal verge and extending into the anal canal The lesion is usually associated with severe pain and untreated it tends to run a course of exacerbations and remissions

## AETIOLOGY

A fissure begins as a simple split in the anal canal skin at and just within the anal verge (Fig 115) It is nearly always situated in the midline posteriorly much less frequently in the midline anteriorly and very occasionally in other quadrants

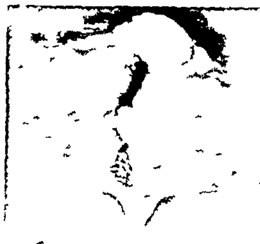




FIG 115 FIG 116

FIG 115—Dorsal anal fissure with skin tag

FIG 116—Dorsal anal fissure without skin tag Haemorrhoidectomy performed five months previously was followed by partial anal stenosis which was responsible for fissure

One cause of a chronic fissure is known A carelessly performed haemorrhoidectomy in which too much skin has been excised results in a tight anus which tears when a motion is passed once this happens a vicious circle of events follows with aggravation of the anal stenosis and the anal fissure (Fig 116)

But in the majority of cases the cause of the split and the reason for the preference it shows for the midline is uncertain Most theories are based on the view that the lesion is mechanical in origin

1 Straining at defaecation causes intense engorgement of the perianal venous plexus and this may be so great as to cause a split in the overlying thin anal skin Such an explanation accounts for the common association of internal haemorrhoids and anal fissure The usual situation of the anal

fissure in the midline posteriorly must be due to some special vulnerability there such as inflammation arising in an anal gland but may be related simply to the antero posterior linear direction of the anus in the perineum

2 The passage of unusually hard faeces or the introduction of hard enema tubing have been thought capable of producing fissures by tearing the anal canal skin but against this theory is the fact that it is almost impossible to produce a fissure artificially by simply incising the anal verge

3 It has been suggested that the anatomical arrangement of the external sphincter is responsible The superficial part of the external sphincter muscle is elliptical and the subcutaneous portion below it is circular If there be some temporary inco-ordination of the external sphincter with slow relaxation of the subcutaneous part a vulnerable ledge forms in the midline posteriorly and anteriorly However the subcutaneous sphincter muscle is hardly large enough to have this effect

## PATHOLOGY

A typical anal fissure is about two centimetres in length and one and a half centimetres in width When the anus is gently parted with the fingers it appears to have a triangular shape with the apex extending to the level of the mucocutaneous junction

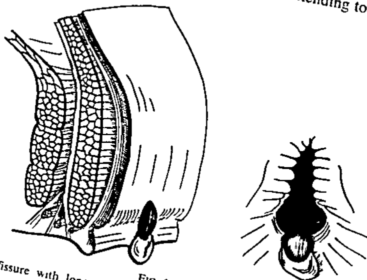


FIG 117
Anal fissure with longitudinally directed fibres of muscularis mucosae muscle in floor and skin tag at distal end

At the onset the ulcer is relatively superficial (Fig 117) The floor contains the longitudinal fibres of the muscularis mucosae muscle and it is their presence which indicates the relatively shallow depth of the ulcer and a likelihood of healing without surgical intervention The edges of the fissure are not raised and if a skin tag is present at the lower end of the ulcer

(sentinel pile) it is small There is no induration of the base but the fissure is extremely tender and is associated with much sphincter spasm

The daily episodes of perianal venous engorgement the persistent movements of the anal sphincters the trauma caused by the passage of faeces and chronic infection hinder any tendency to natural healing The ulcer deepens

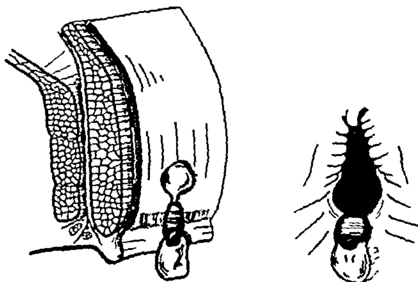


Fig 118
Anal fissure with transversely directed fibres of lower border of internal sphincter muscle in floor skin tag at distal end and mucosal pseudo polyp at proximal end




Fig 119
Anal fissure complicated by infection

and the floor is then formed by the pale circular fibres of the internal sphincter muscle (Fig 118) A skin tag is nearly always present at the lower end of the fissure and is due to oedema of the redundant skin at the proximal end the mucous membrane forms a pseudo polyp for the same reason This secondary mucosal pseudo-polyp first demonstrated by Lane (1865) is found in a high percentage of anal fissures and it may be large enough to prolapse on defaecation

Infection is an important complication of the fissure this is always present but is usually confined to the region of the fissure by the inflammatory response It is possible that the infection of an anal gland was actually responsible for the development of the fissure in the first place The degree of inflammation varies but may be severe and end in suppuration with abscess formation this usually discharges into the anal canal to form a blind internal fistula but may open on to the perianal skin with the formation of a perianal anal fistula (Figs 119 120)

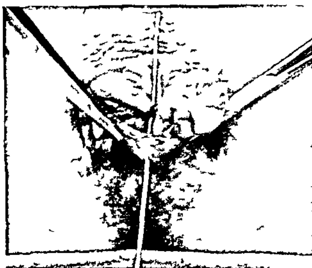


FIG 120
Dorsal anal fissure associated with perianal fistula

## SYMPTOMS

Females are affected more frequently than males (Table VIII) Pain is the main symptom The pain is described as burning shooting or aching in nature and is related to defaecation sometimes the act is extremely painful but more often the pain commences half an hour afterwards and persists for another hour or two If the patient opens his bowels in the morning he is often uncomfortable until mid afternoon

TABLE VIII

AUTHOR S CASES OF ANAL FISSURE TREATED BY SURGERY

| | | |
|---|---|---|
| *Female* | Fissure only | 14 |
| | Fissure associated with haemorrhoids | 14 |
| | Total | 28 |
| *Male* | Fissure only | 13 |
| | Fissure associated with haemorrhoids | 7 |
| | Total | 20 |

Passage of blood with the motion is alarming to the patient even though it is slight in amount it is usually observed on the toilet paper as well as on the motion

If the patient has associated haemorrhoids their prolapse might be to the patient the obvious cause of the discomfort

The pain is so severe that the patient tends to become constipated rather than go through the daily agony but in most cases there is no real alteration in the bowel habit

## SIGNS

*The fissure can always be seen without subjecting the patient to the severe discomfort of rectal palpation* The buttocks are firmly parted and the anal verge inspected this in turn is gently drawn apart with the index finger of each hand If the surgeon has secured the confidence of his patient the anal sphincter will relax to reveal the fissure in most of its length

A skin tag will arouse the suspicion of the clinician *but a skin tag is not invariably present* (Fig 116) The fingers must actually open the anal orifice by this simple manoeuvre the fissure is seen at once (Fig 121)

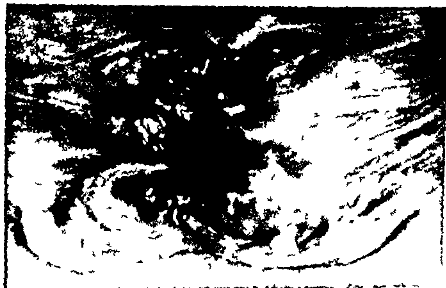


Fig 121
Anal fissure (right posterior) in situation with related skin tag Lower border of internal sphincter muscle is in floor

*Anal Fissure is Diagnosed by Inspection*—A routine step in all ano-rectal examinations should include inspection of the anal orifice after it has been displayed by digital traction on the anal verge The presence of an anal fissure is at once observed and should serve to warn the clinician that palpation within the anal canal will prove painful In these circumstances palpation must often be confined to the perianal region searching for signs of deeper infection In the more patulous type of anus it may be possible to push the finger upwards along the anterior segment and by gently turning the finger feel the upper end of the fissure for a polyp But in most cases digital examination of the anal canal should not be attempted it is not a necessary step in making a diagnosis and it may be responsible for the most acute pain

Further examination with the proctoscope and sigmoidoscope must wait until the fissure pain has been relieved or the patient is under an anaesthetic If it is felt that more information is desirable at this stage pain and tenderness can sometimes be eased sufficiently by the local application of a surface anaes thetic such as Xylocaine five per cent (Astra Sweden)

## DIAGNOSIS

A history of pain accompanying or appearing shortly after defaecation the presence of a little blood on the paper and inspection of the anus after gentle traction on the anal verge enables a diagnosis to be readily made in most cases

It may be difficult to detect associated pathol ogy Haemorrhoids may co-exist with an anal fis sure their presence might be suspected but final proof may not be avail able until operation is per formed on the fissure and in such cases the treat ment of the haemorrhoids should receive priority A carcinoma of the rectum might be present but the association is very uncom mon because the tumour reduces the size of the motions and softens their consistency The clinician will not miss such a chance association if he makes it his practice to sigmoidoscope all patients although this may not prove possible at the initial examination when the patient has an anal fissure

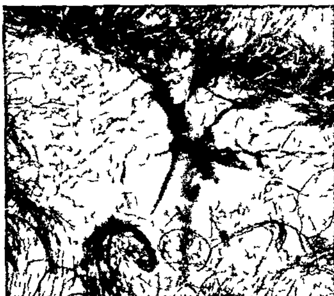


FIG 122
Anus affected by secondary syphilis Skin folds oedematous and accentuated Ulcer on left lateral aspect of anus Perianal skin posterior to anus rough and friable

A lesion resembling anal fissure is sometimes observed as a manifestation of *secondary syphilis* The syphilitic fissure may be seen in any quadrant of the anus It is superficial and appears elevated above the surface It is not very tender the glands in the groin are enlarged and firm (Fig 122)

*Carcinoma of the anus* in an early stage of development may simulate a fissure A tumour is not necessarily situated in the midline anteriorly or posteriorly nor is it confined to that part of the anal canal below the muco cutaneous junction A neoplasm develops an irregular shape and the floor is uneven and typical structures cannot be seen the ulcer feels hard

## TREATMENT

The treatment of an anal fissure depends on the type of fissure the nature of the patient and the preference of the surgeon

*The type of fissure* Acute fissures shallow fissures and *fissures with* minimal surrounding inflammation may respond to simple and conservative *measures* Chronic fissures, deep fissures and those associated with a blind internal fistula will require surgical treatment

*The nature of the patient* Some patients seek just sufficient relief to continue their work without interruption others desire a permanent cure no matter how it be attained The phlegmatic patient with a high threshold for pain is able to withstand such painful procedures as injections around the anus the apprehensive individual may object even to palpation outside the anal canal

*The preference of the surgeon* Different surgeons have different methods of treatment of fissures Success can be claimed for each method so that standardisation is difficult

### CONSERVATIVE TREATMENT

A number of patients will respond to conservative treatment fissures which are acute superficial and not associated with much inflammation are suitable for such treatment provided the patient is willing and is able to co-operate with the surgeon The aim of conservative treatment is to reduce the amount of straining at defaecation so minimising the degree of perianal venous congestion

The importance of regular bowel actions is explained to the patient and he is advised to take the necessary steps to ensure adequate facilities This may entail some adjustment to the daily routine of life and sometimes means domestic changes to secure toilet privacy The diet is investigated to make sure there is sufficient bulk to stimulate peristalsis and yet insufficient residue to leave a large and hard motion If despite careful attention to this matter of obtaining a regular bowel action constipation should persist an aperient may have to be prescribed

Just prior to the bowel action the patient is advised to pass a well lubricated finger along the anal canal into the rectum in order to facilitate the escape of the motion A water soluble lubricant such as Lubafax (Burroughs Wellcome) is much more comfortable than petroleum jelly for this purpose because the latter is difficult to remove and its presence causes discomfort It is more satisfactory to lubricate the anal canal in this way than to do so by the oral intake of paraffin oil

If simple bland lubrication proves painful some added assistance is sometimes obtained with surface analgesics in ointment form such as Xylocaine five per cent (Astra Sweden) or Nupercaine ten per cent *Some patients* prove sensitive to such preparations and develop a rash around the anus

whilst others continue to be disturbed by the pain and by the slowness of the cure and seek more active treatment

If the patient suffers from prolapsing haemorrhoids in addition to the fissure considerable temporary improvement can often be obtained by injecting the haemorrhoids if a proctoscope can be inserted along the anal canal

## DILATATION OF THE ANAL CANAL

A very popular method of treatment is simple digital dilatation of the anal canal Digital dilatation serves to reduce at least temporarily the resistance offered by the anal sphincter muscle during defaecation the amount of straining and accordingly the degree of perianal venous engorgement is less Digital dilatation may be advised for those patients who do not respond to conservative measures and yet who are unable or who do not wish to have the more certain and more satisfactory operative treatment Digital dilatation may be performed either under local or general anaesthesia

### Digital Dilatation under Local Anaesthesia

This can be done at the surgery and success when it comes is often dramatic Either water soluble Novocaine or the oily solution Proctocaine may be used The effect of the latter is said to last longer but this is disputed and certainly complications following its use are seen in cases referred to the proctologist

The injection is best made with the patient lying in the right lateral position (for the right handed surgeon) After cleaning the skin a subcuticular weal is raised with two per cent Novocaine two to three centimetres behind the anus A small syringe fitted with a very fine needle is used for this purpose

For the injection of Proctocaine (or Novocaine) a ten cubic centimetre syringe fitted with a needle five centimetres in length is used The point of the needle is introduced into the weal previously raised The needle is then advanced obliquely forwards at an angle of forty five degrees with the saggital plane and it reaches its forward limit when the tip of the needle is just past the anal canal The injection is made into the ischio rectal space where the nerves it seeks to paralyse are situated Four cubic centimetres are placed in one side and four on the other side in similar fashion the remaining two cubic centimetres in the syringe are injected into the base of the anal fissure with the left index finger in the anal canal

The injection is made whilst the needle is moving to avoid the formation of pools in the tissues which otherwise predispose to infection This technique is particularly important if Proctocaine is used furthermore if an oily solution is used the greatest care should be taken to avoid injecting into the superficial perianal tissues otherwise a slough may form

After a minute or two the sphincters will relax in some cases to such an extent as to allow visualisation of the whole length of the anal canal A second finger can now be gently inserted into the anal canal alongside the first the

zone of inelasticity due to the fissure can usually be appreciated as the sphincters are very lightly stretched

Injections in this region are usually *acutely painful* so that a failure is the more disappointing to the patient And failure is not uncommon as the fissure ulcer heals by second intention with fibrosis there remains a weak area which may split again the force with which the anal canal can be stretched safely is difficult to judge and after local anaesthesia it is often done inadequately Injection treatment does not remove the skin tag nor the mucosal polyp which is often present Injections in such an area may cause abscess and fistula formation and if Proctocaine is injected superficially an ulcer may result

**Digital Dilatation under General Anaesthesia**

If the fissure is too painful or the patient too apprehensive to permit local injections digital dilatation can be performed under general anaesthesia This can be done in the surgery provided adequate facilities are available

The dilatation should be performed very gently because over stretching is *believed* to cause permanent damage to the sphincter muscle whilst under stretching will not cure the fissure As with digital dilatation under local anaesthesia the procedure is uncertain and has the disadvantage of leaving behind skin and mucosal tags

## Excision of the Fissure

Radical cure of an anal fissure entails excision of the ulcer with division of portion of the internal sphincter muscle Goodsall practised simple sphincterotomy sixty years ago with satisfactory results Goodsall s operation consisted of simple division of the sphincter muscle without excision of the ulcer Although there was a wound for some weeks after the operation the severe pain caused by the fissure subsided In patients with chronic fissures who are unwilling to undergo hospital treatment this procedure has more to commend it than digital dilatation

The radical operation involves more than simple division of the exposed lower border of the internal sphincter muscle The fissure and accompanying skin tag and mucosal polyp are removed The formation of a blind internal fistula is prevented by careful construction of the operation wound combined with watchful post-operative management or better by the application of a skin graft at the time of the excision

**Pre-operative Treatment for Excision of Anal Fissure**

The patient has the same pre-operative treatment as for anal fistula An intestinal sulphonamide (*i e* succinylsulphathiazole May & Baker) is given for five days before the operation Admission to hospital is arranged for the day preceding operation No special treatment is required indeed enemas

and bowel washouts are contra indicated because of the pain produced by such treatment A suprapubic shave is unnecessary

**Technique of Excision of Anal Fissure**

Under general anaesthesia the patient is placed in lithotomy position and a triangular piece of skin is outlined with the apex at the anus and the base outwards and which includes the fissure (Fig 123 A) This piece of skin

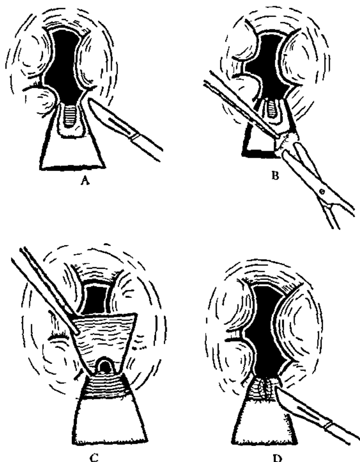



Fig 123
Excision of anal fissure A—Line of incision outlined B—Skin flap raised C—Skin flap and fissure excised D—Lower border of internal sphincter muscle incised

together with the fissure is dissected off the underlying tissues commencing at the base and ending at the apex and including the skin tag and the mucosal pseudo polyp at the anal end of the wound (Figs 123 B C) The lower border of the internal sphincter muscle is divided in the centre of the wound (Fig 123 D) as the ends of the divided muscle retract a smooth wound approximately four centimetres long and four centimetres wide remains If the

wound is to be left open to heal by granulation tissue a dressing is applied and the patient returned to his bed

## Post operative Treatment if the Wound is Left Open

The patient is given morphia for pain and if necessary is allowed to stand out of bed to void A light diet is prescribed until the bowels have opened and every endeavour is made to secure this first action by the third or fourth day after operation The dressings applied at operation will come away with the motion the wound is then cleaned with saline and a dry dressing applied in such a way as to keep the wound as flat as possible There after a bowel action each day is followed by a hot bath and a dressing The wound requires the same strict supervision by the surgeon as is adopted for

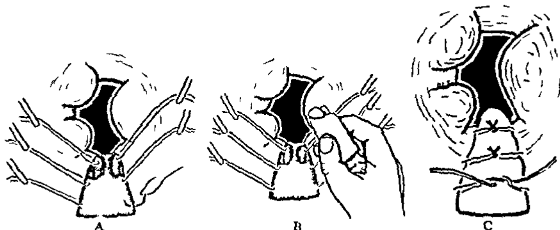



Fig 124
Primary skin graft following excision of anal fissure A—Guy sutures inserted B—Mould covered by thin sheet of skin applied C—Graft in position

the fistula wound if a tight anus and the possibility of recurrence is to be avoided The surgeon should dress the wound as frequently as possible and for this reason the patient should be kept in hospital until healing can no longer be influenced by the dressing technique Usually the patient is in hospital for about two weeks but it takes another two or three weeks for healing to be complete In good hands the results of the excision and open wound technique are excellent but the post-operative treatment is prolonged and usually requires a fortnight in hospital if supervision should relax the wound may heal incorrectly and cause partial stenosis at the anus and be responsible for recurrence

## Excision with Primary Skin Graft

The best treatment is to apply a free split thickness skin graft to the wound after excision (Figs 124 A B C) The fissure is excised in the same way as outlined above but instead of allowing the wound to heal by second intention a skin graft is applied as a primary procedure (Hughes 1953)

After excision of the fissure a thin sheet of skin somewhat larger in size than the wound to be covered is cut from the inner aspect of the left

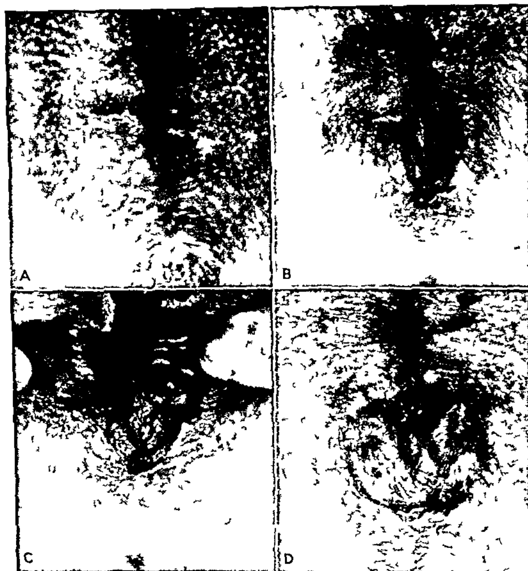



FIG 125

A—Low anal fistula associated with dorsal fissure (not seen)
B—Fistula and fissure excised
C—Size of wound after placing traction on anal verge
D—Fifth post operative day showing wound covered by viable skin graft

thigh After haemostasis has been secured the graft is placed over the wound and the edges sutured to the edges of the wound fine black silk or fine chromic catgut (size 4/0) threaded on a small round bodied or cutting-edged needle has proved satisfactory and as the interrupted sutures are inserted their ends are left long

Before the dressings are applied any blood clot is syringed away from under the graft A layer of tulle gras is placed over the surface of the graft and small pieces of cotton wool moistened in normal saline are carefully and firmly placed into position in such a way as to keep the graft in position *without movement and to prevent haematoma formation under the graft* The dressings are retained in place by tying the long ends of the interrupted sutures across the surface of the dressing Further support is given by a piece of gauze partly inserted into the anal canal and the whole is given protection with elastoplast strapping crossing from one buttock to the other Another way of fixing the graft in position is illustrated in Figure 124 A B C

**Post operative Treatment**

Bed rest is maintained until the graft is inspected although if it is difficult for the patient to void it may prove desirable to allow him to stand carefully on his feet A light diet is permitted The patient rarely has trouble keeping the bowels confined until the first dressing is done Chemotherapy is not necessary

The graft is inspected on the fourth or fifth post-operative day A nervous patient may require a general anaesthetic The elastoplast is removed from the buttocks the sutures cut and the dressing lifted gently off the wound In most cases the graft has 'taken satisfactorily (Fig 125) Any excess overlapping skin is removed after which a small piece of cotton wool is placed over the graft but no other dressings are required The patient is allowed out of bed and the bowels usually act of their own accord the same or the next day and he can then be discharged from hospital No further dressings are required although the patient is advised that the new skin is thin and should be treated with care for a week or two After a bowel action it is suggested that he has a hot bath after which he dries the anal region with cotton wool he keeps a wisp of cotton wool in position over the grafted area until he sees the surgeon two weeks after the operation In nearly all cases it is then possible to discharge the patient as cured

TREATMENT WHEN OCCURRING IN ASSOCIATION WITH HAEMORRHOIDS

If the fissure occurs in association with internal haemorrhoids the latter should be treated by ligation and excision The fissure itself can be ignored unless it is associated with skin tag and mucosal pseudo-polyp when it should be excised Whether or not the fissure is excised *the lower border of the internal sphincter muscle should be divided*

If the fissure alone be treated small haemorrhoids become less troublesome because with the removal of sphincter spasm their engorgement is reduced

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*Chapter Ten*

# HAEMORRHOIDS

A LARGE proportion of the population of civilised countries suffers from haemorrhoids it seems that haemorrhoids are related to the inconstancy of the human diet and to the social obligations demanded by civilisation Haemorrhoids are rarely fatal in themselves but they can cause considerable discomfort and may force the sufferer to bed and be responsible for absence from work with consequent economic strain

There are two types of haemorrhoids

1 *Internal Haemorrhoids* —Internal haemorrhoids are redundant portions of the mucous membrane of the anal canal above the anal groove

2 *External Haemorrhoids* —External haemorrhoids are certain swellings occurring at the anal verge and in the anal canal below the anal groove

## HISTORY

The word haemorrhoids is derived from the Greek (*haima* blood *rhoos* flowing) Hippocrates (born 460 B C and died at the age of 104 years) applied this name to the flow of blood from the veins of the anus The term piles (Latin—*pila* a ball) refers to the haemorrhoidal swellings the word seems to have been widely used by the public at the time of John Arderne (b A D 1307) although this surgeon was one of the first to use the word in his writings In his treatise issued in A D 1370 he remarks that the common people call them piles and the aristocracy call them haemorrhoids the French call them figs (from figer—to clot) what does it matter so long as you can cure them

In their treatment the insertion of suppositories the application of leeches and other non operative measures have been practised since the earliest times in Galen s time it was suggested that the stone of India worn around the neck an emerald in the navel or the black leg of a toad in the armpit would check bleeding

The surgical procedures practised by Hippocrates are notably similar in principle to those advocated by some surgeons at the present time for example he recommended that the patient be placed on his back the anus everted as much as possible with the fingers and the piles burnt until dried up The patients heads and hands were held but they were encouraged to cry out to make the rectum project further (Figs 126 127)

Injection therapy appears to be a relatively recent procedure It was first practised by Morgan of Dublin in 1869 using iron persulphate in 1874 William Colles also of Dublin injected a case of piles with iron perchloride Carbolic acid was first used by Mitchell in 1871 at first a number of clinicians advised strengths up to ninety five per cent in the hope of causing the whole



Fig 126
Eleventh or twelfth century Patient stands on edge of bucket haemorrhoid are pulled down with a hook and excised with a broad bladed knife

Fig 127
Fifteenth century wood-cut A surgeon about to treat haemorrhoids Note his mount at door the spectacles on nose the lamp in left hand the crushing instrument in right hand and dish to catch blood on floor

pile to slough but now the solution is used in strengths of about five per cent and the objective is to cause fibrosis sufficient to hinder prolapse with defaecation

## INTERNAL HAEMORRHOIDS

Internal haemorrhoids derived from the anal canal above the anal groove are the most common cause of bleeding with defaecation and may be responsible for heavy blood loss For this reason they have been regarded as primarily vascular in origin

**Surgical Anatomy**

The mucosa of the upper anal canal lined by cuboidal and columnar epithelium secretes mucus and normally is possessed with some redundancy When this redundancy becomes excessive internal haemorrhoids result The redundant prolapsing mucosa does not form a regular ring of mucous membrane but is arranged in three main columns known as the *primary haemorrhoids* These are situated in the right anterior right posterior and left lateral positions (Fig 128) Smaller *secondary haemorrhoids* also occur between these primary haemorrhoids the most common of which is situated in the midline posteriorly The reason for this orderly arrangement of the haemorrhoidal zone is not certain but two explanations have been offered



Fig 128
Redundant perianal skin associated with third degree haemorrhoids

1 The tributaries of the superior haemorrhoidal vein have their origin in the anal canal and gather as a plexus in the submucosa of the anal canal The plexus is arranged in three main columns before passing through the muscular coat of the rectum These clumps are said to correspond to the haemorrhoidal redundancy of the mucosa of the anal canal It is the enlargement and engorgement of these veins which is believed by some to be the cause of haemorrhoids

2 The longitudinal muscle coat of the large bowel is arranged into three main taeniae This arrangement tends to disappear in the rectum but it has been suggested that taenial thickenings may persist and that between them the bowel is not well supported and prolapses as haemorrhoids

The haemorrhoids appear with defaecation they may return spontaneously into the anal canal but the sphincteric muscle of the anal canal closing over the end of a motion may prevent the internal haemorrhoid from returning discomfort pain and bleeding result

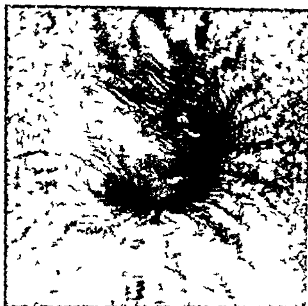


FIG 129
Redundant perianal skin corresponding to a third degree right anterior haemorrhoid

Whatever be the cause of haemorrhoids their prolapse causes intense engorgement of their vessels because venous return is obstructed The internal haemorrhoidal plexus of veins anastomoses freely with the peri anal or external haemorrhoidal plexus of veins so that engorgement of the former is associated with similar engorgement of the latter Repeated episodes of venous congestion soon results in redundancy of the mucous membrane and of the perianal skin (Fig 129)

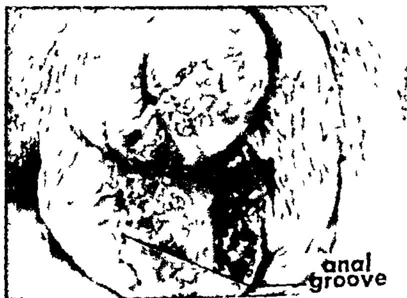



FIG 130
Third degree right anterior and right posterior internal haemorrhoids

When the haemorrhoids prolapse it is possible to see a groove (the anal groove) at the lower end of the internal haemorrhoid above the groove is

the reddish mucosa of the internal haemorrhoid whilst below it is the bluish skin of the anus and lower anal canal (Fig 130)

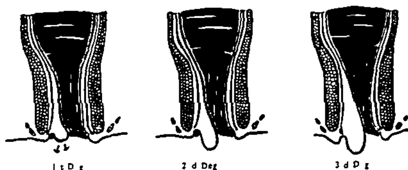



Fig 131
The three stages in development of internal haemorrhoids

**Surgical Pathology of Internal Haemorrhoids**

There are three degrees of severity of haemorrhoids (Fig 131)

First Degree Internal Haemorrhoids —The mucosa prolapses just sufficiently to be caught by the closing anal sphincter muscle Arterial blood continues to enter the haemorrhoidal plexus within the prolapsed haemorrhoid but the venous return is obstructed The veins distend rupture as does the thin overlying mucosa and haemorrhage occurs The haemorrhage may be quite severe with blood streaming into the closet but stops as soon as the haemorrhoid returns which it does spontaneously The patient is unaware in many cases that there is any prolapse the haemorrhage draws his attention to the condition



Fig 132
Prolapsed third degree haemorrhoids with much oedema of perianal space

Second Degree Internal Haemorrhoids —If the mucosa prolapses further the patient realises that there is a protrusion but it usually disappears spontaneously after the bowel action is completed The sphincter may however prevent its return to the anal canal and the veins within the haemorrhoid may become traumatised and rupture or thrombose Thrombosed internal haemorrhoids project beyond the anal verge they are associated with oedema of the related part of the perianal space (Fig 132) The anal sphincter may

so grasp the prolapsing haemorrhoid that the blood supply is cut off completely to cause ischaemia and necrosis of the haemorrhoid

THIRD DEGREE INTERNAL HAEMORRHOIDS —In long standing haemorrhoids the anal sphincter relaxes and the internal haemorrhoid is chronically prolapsed The haemorrhoids can be pushed back into place manually but they reappear on the slightest effort they prolapse not only with defaecation but also when the patient coughs or bends The support given to the haemorrhoid at the anal groove is weak and the anal groove itself prolapses (Fig 133)



A B

FIG 133
A—Redundant perianal skin opposite three primary haemorrhoids
B—Traction on anal verge brings internal haemorrhoids to anal verge

The mucus from the mucous membrane of the anal canal irritates the skin After a time the mucous membrane covering the lower part of the prolapsed internal haemorrhoid becomes the seat of metaplasia and white patches resembling leukoplakia appear

**Symptoms of Internal Haemorrhoids**

BLEEDING —The most common symptom and certainly the most alarming is haemorrhage Blood is usually noticed in the closet or on the paper the loss may be slight or so severe and persistent as to be responsible for a chronic anaemia With first degree haemorrhoids bleeding is often the only symptom although there may be some discomfort on defaecation

PAIN —Haemorrhoids are associated with some discomfort but they are not usually painful Severe pain is suggestive of an associated anal fissure Strangulation of the internal haemorrhoids by the anal sphincter is responsible for acute pain requiring bed rest and analgesics for relief

LUMP —In second and third degree haemorrhoids the patient is aware of a lump in the region of the anus This may appear only on defaecation and disappear spontaneously but in advanced cases the lump is prolapsed continuously although it can be pushed back by the patient Thrombosed internal haemorrhoids cause a painful and tender lump which cannot be reduced

DISCHARGE —A mucous discharge is usual with chronically prolapsed third degree haemorrhoids but not with those of lesser degree

IRRITATION —A certain amount of perianal irritation is not uncommon with haemorrhoids but it is rarely severe In most cases of pruritus ani haemorrhoids are either absent or small

BOWEL HABIT —The daily bowel habit is usually undisturbed by the presence of haemorrhoids Associated constipation is common but it may be an effect rather than a cause A number of patients with haemorrhoids complain of unsatisfied defaecation

**Ano Rectal Examination**

INSPECTION —It is uncommon to find internal haemorrhoids without an indication of their presence visible in the perianal skin at the anal verge Nearly always the perianal skin is redundant in relation to the corresponding internal haemorrhoid (Figs 128 129 133) Third degree haemorrhoids can be brought to the anal verge by gentle traction on the anal verge whilst the patient strains

PROCTOSCOPY —Proctoscopy enables an accurate diagnosis of haemorrhoids as well as the degree of prolapse The proctoscope is inserted the obturator withdrawn and the proctoscope itself gradually removed The mucosa at the ano rectal ring falls into the mouth of the proctoscope on reaching the lower end of the anal canal there is a normal tendency for slight prolapse of the anal canal mucosa In first degree haemorrhoids the mucosa prolapses a little further It is momentarily caught by the anal sphincter and may sometimes be seen to become congested and plum-coloured Occasionally the vessels and mucosa rupture to give a sharp haemorrhage with blood *spurting away from the anus Second degree haemorrhoids prolapse further* and remain outside but they return when the patient allows the sphincter to contract Third degree haemorrhoids require manual reposition they can be pushed back but tend to prolapse again and to remain chronically prolapsed

SIGMOIDOSCOPY —Sigmoidoscopy is not necessary for the diagnosis of haemorrhoids but it forms a routine part of the examination The surgeon cannot reassure the patient that cancer is not responsible for the bleeding until the sigmoidoscope has been passed The patient with bleeding from the anal canal may believe that haemorrhoids are responsible but he wishes cancer

to be excluded with certainty Some *patients with extremely large piles seek* reassurance that there is no tumour rather than actual treatment for the *haemorrhoids*

## TREATMENT OF INTERNAL HAEMORRHOIDS

Not all patients with haemorrhoids require active treatment some on learning that haemorrhoids are responsible for the symptoms and that there is no malignant tumour present decline treatment

*Haemorrhoids* are common in pregnancy and no active treatment is required The situation should be explained to the patient the diet adjusted to ease any tendency towards constipation and advice given as to correct habits of defaecation and how to replace prolapsed haemorrhoids

Active treatment should not be denied to the elderly or otherwise infirm *but should such treatment be declined similar advice may help*

If the surgeon performs a general examination in all cases he is unlikely to make the error of operating on patients with bleeding tendencies or on those with chronic liver disease (*nutritional and virus hepatitis*)

### INJECTION TREATMENT OF INTERNAL HAEMORRHOIDS

When varicose veins are injected the solutions are placed into the veins themselves so sclerosing the intima and causing their thrombosis The usual solutions used for *injecting haemorrhoids are inserted into the interstitial* tissue of the submucosa and not into the veins of the haemorrhoid This causes fibrosis within the submucosa and adherence of the mucosa to the muscularis

Injection of haemorrhoids lessens the degree of prolapse at least temporarily *but especially in first and second* degree haemorrhoids Bleeding is reduced and often stopped completely this favourable effect on haemorrhage is not due to thrombosis of the haemorrhoidal veins but to the interstitial fibrosis preventing prolapse

**Selection of Cases for Injection Treatment**

1 First degree internal haemorrhoids which bleed can be injected with good results

2 Second degree internal haemorrhoids are not cured by injections although the bleeding is stopped for long periods and prolapse is temporarily relieved A further course of injections may be given on recurrence and in this way it is sometimes possible to tide the patient over the inconvenience *caused by the haemorrhoids* at least for some time Therefore patients with second degree haemorrhoids should be given the option of injection treatment *if they are troubled by bleeding or* if they are not desirous of or suitable for operative treatment

3 Third degree haemorrhoids should not be injected unless the patient is much troubled by bleeding and there is to be some delay before operation The prolapse is not noticeably improved by injection

**The Injection Syringe**

The injections are given with a ten cubic centimetre syringe fitted with a locking needle (Fig 134) Considerable force is required to push the viscid fluid down the needle and if the needle does not lock firmly on to the syringe much of the injection may escape at the union of the syringe and needle

The needle should be ten centimetres long it may be straight or curved although the former seems to be easier to manipulate and control The average proctoscope has a tubular portion about five centimetres long so that the needle must be longer than this in order to keep the syringe clear of the mouth of the proctoscope this enables the clinician to observe the end of the needle continuously The needle should have some marking device similar to the ureteric catheter at the lower end so that the surgeon always knows just how deep the needle has penetrated The needle of the Gabriel syringe is surrounded by a sheath which terminates about one and a half centimetres from the bevel of the needle This sheath does not prevent the needle from perforating the anal canal and it should be used as an identification mark rather than a shield

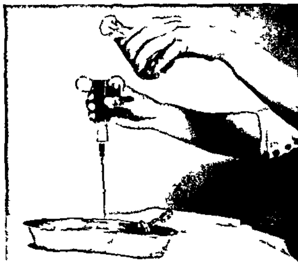


Fig 134
Method of filling haemorrhoidal syringe with five per cent phenol in almond oil Needle is in position

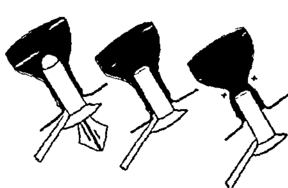
**The Injection Solution**

The most widely used solution is five per cent phenol in almond or peanut oil A few drops of menthol removes the unpleasant odour of the solution It is non toxic to the body and harmless locally it appears to cause a satisfactory interstitial fibrosis with minimal tissue necrosis Large amounts can be injected locally up to ten cubic centimetres can be pushed into the one haemorrhoidal zone without danger and all three haemorrhoids can receive this same volume at the one time with little or no discomfort A useful routine in practice is to fill a ten cubic centimetre syringe and inject four cubic centimetres into the left lateral haemorrhoid three cubic centimetres into the right

anterior and the remaining three cubic centimetres into the right posterior haemorrhoid

## Technique of Injecting Internal Haemorrhoids

The patient is placed in the left lateral position The proctoscope is passed the obturator removed and the ano rectal ring identified by sliding the proctoscope up and down within the anal canal and lower third of the rectum The mucosa at the ano rectal ring closes in on the mouth of the proctoscope and just below this level the upper ends of the three primary internal haemorrhoids can usually be identified (Fig 135)



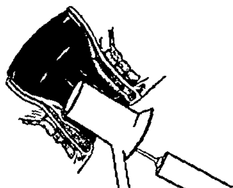


FIG 135 FIG 136

FIG 135—*Site for injection of internal haemorrhoids*

FIG 136—*Injection of internal haemorrhoids in submucosa at level of ano rectal ring*

Obstructing faecal material is pushed away with a pair of forceps if the faecal material is liquid a cotton wool swab is pushed into the lower third of the rectum and is left there No attempt is made to sterilise the over lying mucosa

The syringe is held in the right hand the needle passed down the procto-scope and the point of the needle is brought to lie on the mucosa just beyond the distal end of the proctoscope The point is then gently thrust through the mucosa into the submucosa at a site corresponding to the left lateral haemorrhoid (Fig 136) Four cubic centimetres are injected at the same time withdrawing the proctoscope slightly to permit diffusion of the solution through the anal canal submucosa The fluid should flow down the needle comfortably even though pressure is necessary if undue force is required the needle is probably in the wrong plane whilst if the fluid runs in too easily the locking mechanism has come adrift or the needle has penetrated a fold of mucous membrane so that the point projects into the anal canal or rectum above it

The needle is moved to the right anterior zone and three cubic centimetres are injected into the submucosa Particular care should be taken when injecting the right anterior haemorrhoid because of the proximity of the urethra in the male and vagina in the female The remainder of the solution is injected into the submucosa at the top of the right posterior haemorrhoid

The proctoscope is removed and oil which may have soiled the perianal skin is wiped off and the patient allowed to get up off the couch after an hour or two the oil gravitates under the sensitive anal canal skin causing some soreness The actual injection is not painful but is associated with an uncom fortable feeling of rectal distension

The patient is advised not to pass a motion for twenty four hours after the injection but thereafter may resume a normal bowel habit He is given an appointment for three weeks later

If a further injection is given at this second appointment the clinician must appreciate that the first injection causes submucosal fibrosis so prevent ing subsequent injections from flowing easily whereas four cubic centimetres was easily injected at the first occasion less than a cubic centimetre might be possible at the second An over-enthusiastic clinician may damage the bowel wall if he tries to repeat the volume used at the first injection

*The first injection is the most important* —The first injection given for haemorrhoids is the one most likely to give a good result The response of the patient to this injection will be a fairly reliable indication as to whether or not such treatment should be continued

**Complications of Injection Treatment**

1 PAIN —Pain is not a feature of the injection and the patient is often surprised when told that the haemorrhoids have been treated Some discomfort is to be expected but severe pain indicates an error in technique The injection has been made too low or too deep The injections should not be as low as the anal papillae and certainly never below the anal groove they should not be placed into or through the muscle layers of the anal canal

2 HAEMORRHAGE —The point of the needle sometimes punctures a branch of the superior haemorrhoidal artery so that on withdrawal of the needle a pulsating stream of blood issues from the wound The proctoscope should be removed and the patient examined in ten minutes The bleeding has by then nearly always stopped but if still in progress digital pressure will have to be applied and maintained until it has stopped

3 ULCERATION —Sloughing at the injection site is rare with the phenol in oil solution recommended above even when the injection is inadvertently placed in the mucosa and allowed to cause a white weal Some other solutions have bad reputations glycerine solutions for example have been responsible for deep injection ulcers and serious secondary haemorrhage Attention to technique and the avoidance of unproven solutions will prevent ulceration If an ulcer does form no special treatment is required but it should be kept under observation until healed

4 HAEMATURIA —Occasionally a sharp haematuria follows injection of haemorrhoids This complication follows the injection of the right anterior haemorrhoid in the male and is caused by direct trauma to the urinary tract

at prostatic level from advancing the needle too deeply It is a serious complication because it necessitates investigations and hospitalisation for several days Treatment is symptomatic

5 MISCELLANEOUS —Sensitivity to the injected agent may cause a temporary proctitis although this is uncommon Occasionally an extensive venous thrombosis causes acute discomfort in these circumstances palpation discloses lumpy induration outside the anal canal Sometimes the injection appears responsible for abscess formation in relation to the anal canal Jaundice has been reported and has been attributed to injection inadvertently into the inferior haemorrhoidal veins (Dickson Wright 1950)

## OPERATIVE TREATMENT OF INTERNAL HAEMORRHOIDS

*The most popular and perhaps the most satisfactory operation for haemorrhoids is that which has been developed at St Mark s Hospital for Diseases of the Rectum in London and which is known as the* Ligation and Excision Operation The operation is designed to remove the prolapsing mucosa of *the anal canal and at the same time produce a smooth anus by excision of* the corresponding redundant perianal skin The results of the operation are *excellent*

### Selection of Cases for Operative Treatment

1 Second degree internal haemorrhoids are suitable especially if the corresponding perianal skin presents tags

2 Third degree internal haemorrhoids should be treated by operative means injection treatment rarely brings more than very temporary relief

Occasionally patients presenting for treatment have some general physical infirmity which may be deemed a contra indication to operation under general anaesthesia The surgeon however should not be deterred from advising operation under local anaesthesia because third degree haemorrhoids cannot be treated satisfactorily by injection or other conservative means

### Pre Operative Treatment

When the decision to operate is made and accepted the patient is given a supply of an intestinal sulphonamide (succinylsulphathiazole May & Baker) and is advised to start oral administration five days before operation (five tablets of succinylsulphathiazole four times daily) Such premedication reduces the bacterial flora within the anal canal so lessening the severity of wound infection and the incidence of post-operative secondary haemorrhage

Admission is arranged for the day preceding operation No aperients enemata or bowel washouts are necessary although the patient is advised to have a bowel action a short while before the operation *No restrictions are* placed on the diet Only the hair around the anus is shaved

***Technique of the Ligation and Excision Operation for Internal Haemorrhoids***

After he has been anaesthetised the patient is placed in lithotomy position The perineum is swabbed with an aqueous solution of an antiseptic and drapes are placed in position (Fig 137)

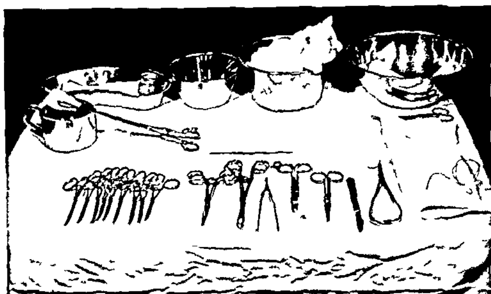


FIG 137
Instruments laid out ready for ligature and excision of internal haemorrhoids

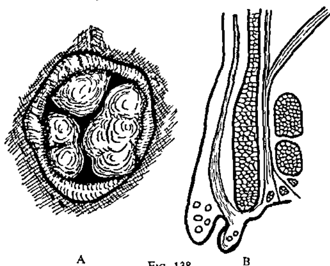



FIG 138
Third degree internal haemorrhoids

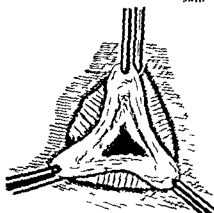
A pair of straight artery forceps is placed on the perianal skin opposite each of the three internal haemorrhoids in the left lateral right anterior and *right posterior segments (Figs 138 139)* Traction on these forceps opens

the anal orifice and at the same time displays the lower end of the corresponding internal haemorrhoid The forceps are held by assistants each forceps should be held in a separate hand

Curved artery forceps are placed firmly on each of the mucosal folds representing primary haemorrhoids Curved artery forceps are used to enable

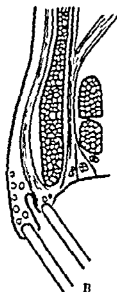


Fig 139
Internal haemorrhoids displayed by traction on corresponding perianal skin



A

Fig 140
The internal haemorrhoids are drawn outside anus to form Milligan's triangle of exposure




rapid distinction from the three straight forceps which were placed on the perianal skin By gently pulling downwards and outwards on each of these forceps the pink rectal mucosa is brought into view in the form of a triangle known as Milligan's 'triangle of exposure Both the perianal (straight) and the haemorrhoidal (curved) forceps may require some readjustment before exposure is satisfactory (Fig 140)

The left lateral haemorrhoid is first ligated The two forceps the perianal and haemorrhoidal attached to the left lateral haemorrhoid are both held in the surgeon s left hand The scissors held in the right hand are so placed that

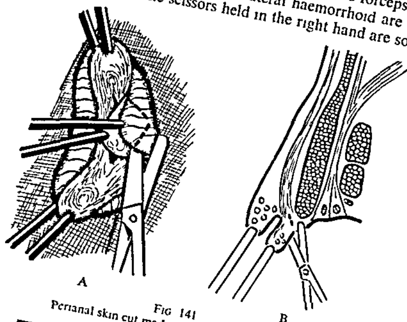



Fig 141
Perianal skin cut made to level of anal groove

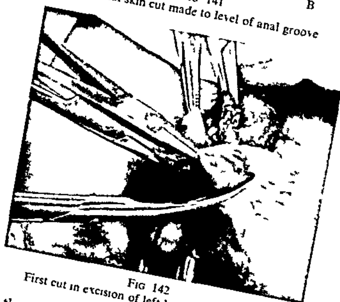


Fig 142
First cut in excision of left lateral haemorrhoid

one blade lies in the anal groove between the internal haemorrhoid and perianal skin and the other blade on the surface of the perianal skin The scissors cut through the skin and corrugator ani muscle A second cut similar to the first and above it is so directed as to meet the first at a V shaped junction (Figs 141 142 143) The triangular flap of perianal skin is dissected off the

underlying sphincter musculature by *deliberate* sharp dissection with the scissors aided by traction on the perianal straight *artery forceps* The skin to be excised is carefully planned to include tags and *irregular* skin The well-defined lower




Fig 143
Excision of right anterior haemorrhoid A—First skin cut B—Second cut

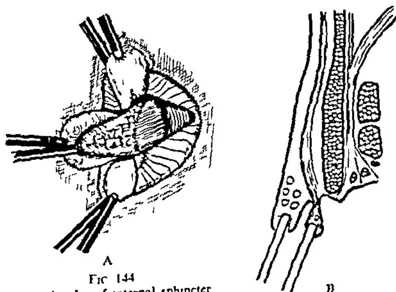



Fig 144
Lower border of internal sphincter muscle and muscularis mucosae displayed

border of the internal sphincter muscle is exposed at the inner edge of this muscle are the longitudinally disposed fibres of the muscularis mucosae muscle which come into intimate relation with the anal canal skin at the anal groove (Figs 10 144) Further dissection upwards is not necessary because the prolapsing haemorrhoid does not include rectal mucosa

Traction on the haemorrhoidal (curved) forceps brings the mucosa well down and a ligature is placed around the haemorrhoid and tied tightly (Fig 145) The ligature (No 2 chromic catgut) includes the muscularis mucosae muscle which does not retract upwards when traction is taken off the forceps because of its intimate relation with the longitudinal muscle around the lower edge of and through the internal sphincter and also because of the restraining influences of the intervening skin and mucosal bridges

The amount of bleeding from the perianal skin cut is variable some patients require no haemostasis other than pressure but in others up to half a dozen ligatures are necessary

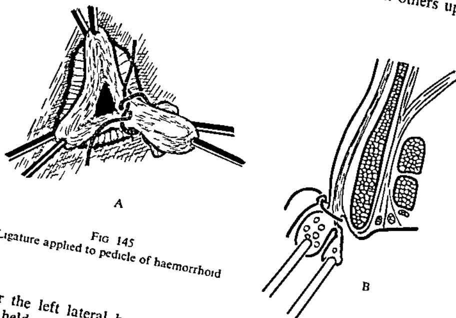



Fig 145
Ligature applied to pedicle of haemorrhoid

After the left lateral haemorrhoid has been ligated the ligature is left long and held in a pair of artery forceps by an assistant so as to maintain exposure The right posterior haemorrhoid is the second haemorrhoid to be dissected because if the right anterior should precede it blood will tend to obscure the operative field The surgeon must watch the skin bridges between the skin cuts if too much skin is removed for example leaving skin bridges of less than a centimetre in length stenosis will develop at the anal margin

After each of the haemorrhoids has been ligated that part distal to the ligature is excised (Fig 146) The ligatured stumps are pushed back into the anal canal to leave three skin wounds at the anal verge these are trimmed with a pair of fine scissors so that any potential oedematous skin tags are removed (Fig 147) These skin wounds are small and may either be left open to heal by second intention or may be sutured with plain catgut The latter modification is useful for haemostasis but it is doubtful whether the result of the operation is favourably influenced

One or more pieces of gauze may be inserted into the anal canal at the conclusion of the operation and left there to come out with the first bowel

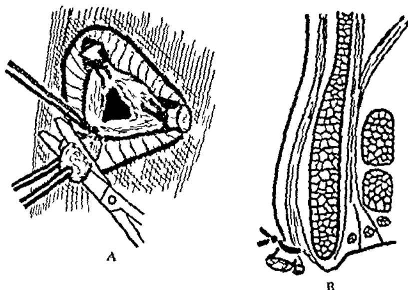



Fig 146
Each haemorrhoid ligatured and redundant tissue distal to ligature excised

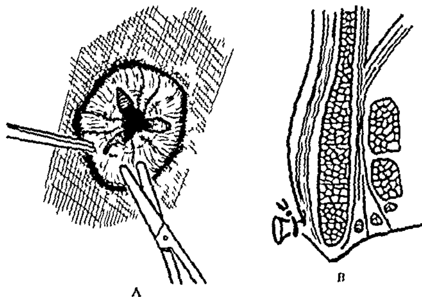



Fig 147
Ligatured haemorrhoidal stumps pushed back into anal canal and skin wounds trimmed

action but their presence probably increases the amount of post-operative discomfort Some surgeons prefer to place a tube along the anal canal into the rectum and to leave it there for two days but it has no particular value and is uncomfortable

**Post operative Treatment**

Pain may be severe and require morphia for relief No restrictions are placed on diet although for a day or two the food intake is naturally less The patient may get out of bed when he feels like it and this usually means the day after operation

The bowels are permitted to act when the urge for defaecation arises some patients actually have a bowel action within twenty four to thirty six hours after operation In most cases however there is no bowel action before the end of the second day after the operation when the patient may be given an aperient If the patient has his own special mixture this may be prescribed the addition of paraffin will lubricate the surface of the motions which are sometimes a little hard

On the third day after operation the patient is permitted a hot bath The gauze plugs may then be thoroughly soaked and withdrawn by the patient himself without undue discomfort Should a bowel action have occurred on the morning of the third day the gauze dressings may already be out before the patient enters the bath

Following the bath the anal region is dried with cotton wool the only dressing then required is a small piece of cotton wool the corner of which is lightly tucked into the anal canal to prevent it from falling out This dressing may have to be changed several times during the day because its purpose is to keep the perianal skin dry to avoid irritation

A routine is then developed for the remainder of the patient s stay in hospital After a normal breakfast the patient has a bowel action a bed pan is unnecessary as the patient is quite mobile and can visit the lavatory After the bowels have opened the patient makes no attempt to clean the anus but proceeds to the bath after which the anus is dried and dressed If the bowels have not acted by the fourth day the patient should be strongly persuaded to attempt this he may be given an injection of morphia and a small olive oil enema to aid him

Some surgeons order the daily passage of a finger into the anal canal commencing a day or two after the first bowel action Such a procedure causes discomfort and to many patients is an unpleasant procedure In any case it is unnecessary because a daily bowel action will give sufficient dilata tion it that is required whilst an operation performed with skill requires no treatment of this kind

**Discharge from Hospital after Operation**

An unpredictable complication following operation for internal haemor rhoids is secondary haemorrhage In most cases it commences within ten days of the operation and therefore ideally the patient should be kept in hospital during this post operative period However if this length of stay in hospital is not acceptable to the patient he may leave hospital after the bowels have acted satisfactorily provided his immediate readmission to hospital can be

arranged if necessary If the patient should be discharged on the fifth or sixth day he should be seen again by the surgeon on or about the fourteenth day so that the wounds can be reviewed Healing is not complete at this stage and defaecation is still accompanied by some discomfort

The patient is examined three weeks after operation by which time the wounds are healed or almost healed A rectal examination will reveal a smooth anal canal although the site of the ligated stumps can be recognised The perianal zone should be smooth and although oedematous skin tags may be present the surgeon should be in no hurry to remove them because they usually become so small as to be insignificant

**Complications of Operative Treatment**

The ligation and excision operation performed carefully should rarely be followed by any serious complication It is unfortunate however that the operation is regarded by some as a minor procedure because it may end in a major tragedy Like all operations it should be done with a gentle touch and with attention paid to the smallest detail

1 HAEMORRHAGE —Post-operative haemorrhage may be early or late Early primary and reactionary haemorrhage is nearly always from the vessels in the perianal skin wound and the bleeding vessel is easily secured although the patient may have to be returned to the theatre and anaesthetised Early haemorrhage from the ligated pedicle is most uncommon but may occur if the surgeon ties the ligature without asking the assistant to remove the haemorrhoidal (curved) forceps as the ligature is tightened if the tip of the forceps is included the ligature will be too loose If the haemorrhage is from the internal haemorrhoidal plexus the patient should be returned to the theatre and the pedicle retied

Secondary haemorrhage may be very severe and is practically always from the internal haemorrhoidal plexus it commences as the ligatures slough off usually around the tenth post-operative day but may be as early as the fifth or as late as the twentieth day The loss of a small amount of blood at this time is very common but fortunately a severe bleed is rare The blood passes into the rectum and acts as an enema causing the frequent passage of fresh blood the amount of blood lost may be alarming and even fatal (Table IX)

The treatment of secondary haemorrhage is influenced by the fact that the bleeding usually stops spontaneously although it must be appreciated that the patient may lose a very large quantity of blood in a very short space of time At the first suggestion of severe haemorrhage often indicated by the passage of a cupful of fresh blood the surgeon should take some blood for typing and have it held in readiness for cross typing if the bleeding continues The foot of the bed should be raised the patient given a warm drink and an injection of morphia the pulse rate and blood pressure are charted at fifteen minute intervals

TABLE IX

INCIDENCE OF SEVERE SECONDARY HAEMORRHAGE FOLLOWING HAEMORRHOIDECTOMY

(Author's Series)

| *Ligature and Excision of Internal Haemorrhoids* | | |
|---|---|---|
| | *No of cases* | *No of patients with severe secondary haemorrhage* |
| Female | 114 | 1 |
| Male | 107 | 2 |
| Total | 221 | 3 (1.4%) |

If the patient should continue to pass blood or if the appearance of the patient and the pulse and blood pressure recordings suggest that bleeding continues, transfusion is commenced at once and two pints of blood given fairly quickly. In most instances the bleeding stops and no further treatment is necessary.

If the bleeding should continue despite the transfusion of two pints of blood the patient is transferred to the operating theatre and, after anaesthetising and posturing in the lithotomy position, the anal canal is gently dilated, the bleeding vessel located and underrun with fine chromic catgut on a small round bodied needle.

Bleeding can be controlled by means of pressure exerted by gauze wound around a tube (Lockhart Mummery) but the insertion of this plug is painful without an anaesthetic and if the latter is to be given a direct attack on the vessel should be attempted.

2 INFECTION.—Some infection is inevitable with an open wound in such a contaminated area but this is usually minimal. Occasionally the wounds become indolent and three or four weeks after operation there may be little evidence of healing. These wounds should be cultured and antibiotic sensitivity tests done because the slow progress is due to the infecting organism.

Rarely one of the haemorrhoidal wounds becomes abnormally painful and tender and an abscess forms and discharges to leave a perianal fistula. This complication may be due to a more virulent infection than usual but it is more likely that a fistula (e g a blind internal fistula) was present but was overlooked at operation.

If the skin wound is sutured infection of the wound may persist for some months and be responsible for a tender and discharging scar at the anal verge which is disappointing to the patient. The surgeon should not be in a hurry to intervene because spontaneous recovery is usual.

3 STENOSIS —Stenosis will not occur after careful surgery but in so degree is not uncommon following operations performed by the occasic ano-rectal surgeon The narrowed portion may be at the anal verge or it r be within the anal canal

Stenosis at the anal verge is due to the removal of too much skin remaining intervening skin bridges are too small and as the wounds heal secondary intention the orifice contracts (Fig 148) With each bowel act the skin splits and a fissure forms each act of defaecation causes great p and the patient diets in the hope that the number of visits to the toilet c be reduced so impairing his general health The anal orifice is irregular a

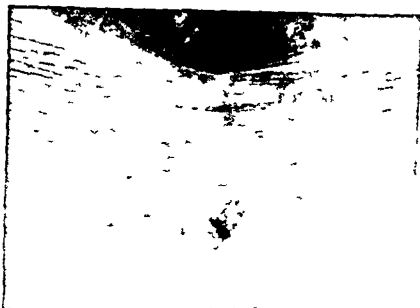


FIG 148
Anal stenosis following haemorrhoidectomy six months previously

greatly contracted and a fissure can be demonstrated Daily digital or instru mental dilatations are unsuccessful but the condition can be cured by surgery The stenosed orifice can be enlarged to a normal size by cutting away a portion of the fibrosed ring which forms the margin and the enlargement can be made permanent by applying a skin graft to the wound because if it is allowed to heal by second intention recurrence is inevitable without inter mittent dilatations The results of this operation are excellent (Hughes 1955)

Stenosis within the anal canal is due to the too generous inclusion of anal canal mucosa in the haemorrhoidal ligature The stricture is usually short and is confined to the mucosa and submucosa The lumen may be too small to admit a finger tip and the mucosa of the rectum and colon above the stricture may be inflamed with secondary abscess and fistula formation If the stenosis is within reach of manipulation from the anus regular dilatation may prove a satisfactory palliative measure but the dilatations done with

a finger or Hegar s dilators may have to be performed for the rest of the patient s life It may prove a feasible alternative to incise the strictured area (internal proctotomy) and apply a skin graft to the vascular wound in the anal canal as a delayed primary procedure

4 RECURRENCE —Recurrence is uncommon after the ligation and excision operation The recurrent haemorrhoid is a secondary haemorrhoid and it can often be controlled by injections but if operation is necessary it should merely entail removal of the single recurrent haemorrhoid

So uncommon is recurrence that in the event of symptoms reappearing the surgeon must carefully re-examine the anal canal and rectum to ensure that no complication such as fissure has supervened or that no associated lesion such as carcinoma polyp or fistula is present

5 IMPACTED FAECES —Faecal impaction follows incomplete bowel actions The patient claims to have opened his bowels each day but in actual fact the evacuation has been far from complete The faecal material remaining within the rectum becomes inspissated to form a large hard mass the mucosa of the rectum is irritated and secretes mucus The patient has a continual sensation of rectal fullness but straining produces faecal mucus only

The diagnosis is readily made because digital examination immediately discloses the impacted faeces It requires a general anaesthetic to break up and remove a hard mass

**Ligation and Excision Operation under Local Anaesthesia**

In some patients if general anaesthesia be refused or thought inadvisable operation must be done with the aid of local anaesthesia

Premedication is so prescribed that the patient is extremely drowsy on arrival in the theatre He is placed in a right lateral position (the right lateral position is much easier for the right handed surgeon performing a perianal injection) and with a fine needle a weal is raised two or three centimetres behind the anus with a local anaesthetic The needle is then replaced with one that is longer and slightly stouter and local anaesthetic is injected into the tissues on either side of the anus The patient is then turned into the lithotomy position and into the perianal skin opposite each of the three primary haemorrhoids two cubic centimetres of local anaesthetic are introduced after which the operation proceeds in the usual way

## OTHER INDICATIONS FOR TREATMENT

**Excision of One or Two Haemorrhoids**

Not all three primary haemorrhoids may be of the same degree one or two may be chronically prolapsed whilst the third is very small In these circumstances the surgeon should confine his excision to the offending

haemorrhoids because post-operative discomfort is less and the end result very satisfactory

### *Secondary Haemorrhoids*

Between the three primary haemorrhoids the surgeon may observe small secondary ones the most common of which is situated in the midline posteriorly If these secondary haemorrhoids are large they should be removed The one in the midline posteriorly is best removed by a separate ligature but others which are closer to the primary haemorrhoid can be included in the main ligature

### Internal Haemorrhoids and Pregnancy

Internal haemorrhoids may be troublesome during pregnancy but they do not often call for special treatment Surgery should be avoided but injections with five per cent phenol in oil can be given if bleeding is persistent

### Internal Haemorrhoids and the Workers' Compensation Act

As internal haemorrhoids increase in size they prolapse more and more easily and a stage is reached where they may come down even with moderate effort If prolapse occurs during manual labour the patient may be tempted to claim compensation from the employer but this is not likely to succeed because internal haemorrhoids are not caused nor aggravated by such exertion

### *Thrombosed Internal Haemorrhoids*

It is impossible to distinguish between a thrombosed internal haemorrhoid and a haematoma of the submucous space A thrombosed internal haemorrhoid may or may not require subsequent ligature and excision whilst a haematoma is usually an isolated event The condition should be allowed to subside and a decision made subsequently as to whether or not surgery is necessary

### Internal Haemorrhoids complicating Anal Fissure

If the patient suffers from both anal fissure and internal haemorrhoids the latter should be removed and the lower edge of the internal sphincter muscle divided in the depth of the right posterior haemorrhoidal wound The anal fissure can be ignored but should be excised if there is a related skin tag or mucosal pseudo polyp

### Internal Haemorrhoids complicating Anal Fistula

*If the patient has an anal fistula a careful examination should be made* to detect the presence of associated internal haemorrhoids because they should be removed with the fistula

## EXTERNAL HAEMORRHOIDS

Various skin tags papillomata etc have been called external haemorrhoids but the term is best kept for the common anal (or perianal) haematoma The lesion is usually caused by straining which ruptures one of the thin walled blood vessels in the perianal or submucous space close to the anal verge (Fig 149) A haematoma varying in size from that of a small pea to that of a cherry forms in the tissues and assumes a loculated shape

1 If the haematoma is superficial it forms a bluish lump just under the skin this occasionally ulcerates and the blood clot is partially extruded spontaneously

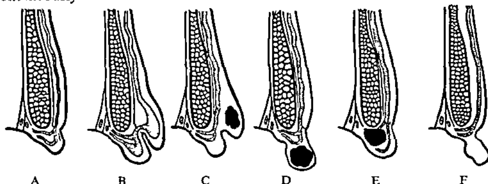



Fig 149

A—Cross section drawing demonstrating vascular relation of internal and external haemorrhoid
B—Engorgement of internal haemorrhoidal plexus associated with engorgement of external plexus
C—Vessel may rupture into submucosa with formation of a blood clot
D—Vessel may rupture into perianal space just under skin
E—Haematoma may form in deeper portion of perianal space
F—End result of such episodes may be a skin tag

2 If the haematoma is more deeply situated the superficial tissue becomes oedematous and the swelling is accordingly more diffuse and may involve half the circumference of the anus

3 The haematoma may form in the lower part of the submucous space and the resulting oedema causes the mucous membrane to appear at the anal verge and so simulate a thrombosed internal haemorrhoid

### Symptoms of Anal or Perianal Haematoma

The outstanding symptom is pain which has a fairly abrupt onset and is associated with the appearance of a tender lump Sometimes a superficial haematoma ruptures through the skin and the patient notices blood In some cases the pain is not particularly severe but because of the presence of the lump the patient fears a growth

### Signs of Anal or Perianal Haematoma

In the localised superficial variety the lump is bluish purple in colour well defined and projects above the surface of the surrounding skin (Fig 150)

Occasionally there is ulceration of the overlying skin In the deep diffuse type the overlying skin is oedematous and causes a *diffuse swelling occupying* one half or more of the anal verge *If the haematoma forms* in the lower part of the submucous space oedematous mucosa can be *seen presenting* above the swollen perianal skin at the anal verge

**Ano Rectal Examination**

*Complete ano-rectal examination must not be neglected* Although the cause of the patient s symptoms is obvious on inspection of the anus a complete ano-rectal examination must not be neglected Some of these patients



Fig 150
Redundant perianal skin Two small superficial perianal haematomas present in left lateral and right posterior position

have a low lying carcinoma of the rectum causing congestion around the anus and predisposing to the haematoma A complete ano-rectal examination may not be possible at the first visit but should be made before the patient is finally discharged from the clinician s care

### Treatment of Anal or Perianal Haematoma

Untreated the pain subsides and the haematoma absorbs Milligan has termed the lesion a five-day self-curing painful lesion of the anus' The patient does not usually report for treatment for one or two days after the onset so that at the time of the first visit the patient can be confidently told that the pain will soon subside A cooling lotion applied locally and aspirin codeine or a little morphia given orally may help to ease the pain more quickly Even large haematomas subside although a permanent skin tag may remain The pain disappears a long time before the lump disappears

**Operative Treatment of Anal or Perianal Haematomas**

Some surgeons prefer operative treatment and evacuate the blood clot Large superficial haematomas can be so treated but the small and the deep ones should be left alone The operation is done under local anaesthesia

The patient lies on his left side and the anus is shaved of neighbouring hair After swabbing the skin with an aqueous antiseptic a local anaesthetic is injected into the skin overlying the haematoma An incision is made into the clot which is shelled out of the tissue the clot is usually made up of several smaller locules separated by strands of tissue and these smaller portions must be removed otherwise symptoms will persist The overlying and now redundant skin should be trimmed conservatively to avoid skin tag formation if the skin is cut away too radically the wound takes a long time to heal It is dressed with a piece of gauze one end of which is tucked into the anal canal Daily dressings are continued until the wound has healed

Recurrent Anal or Perianal Haematoma —In some patients anal or perianal haematomas recur at frequent intervals and within a period of a year or more there may have been a dozen episodes These patients should be treated conservatively because removal of the perianal tissues in association with internal haemorrhoids may not cure the condition The patient should be advised as to the nature of the condition and warned to keep the motions soft and regular and to avoid straining

Anal or Perianal Haematomas complicating Anal Operations —Sometimes the post operative convalescence after a fistula fissure or internal haemorrhoid operation is complicated by the sudden appearance of an anal or perianal haematoma The treatment should be the same as for the haema toma appearing without previous ano rectal surgery

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# PROLAPSE OF THE RECTUM

IN haemorrhoids the anal canal mucosa prolapses and if this be advanced the rectal mucosa may appear at the anal verge On occasions rectal mucosa prolapses independently of the haemorrhoids and the condition is



FIG 151
Prolapse of rectum in child (Patient of Mr Douglas Stephens)

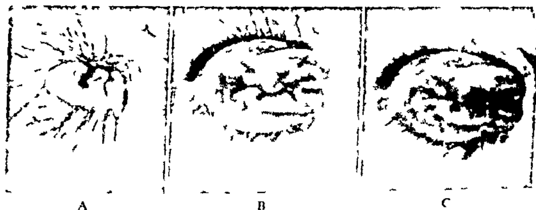



FIG 152
A– Partial prolapse (mucosal) of rectum Left lateral segment prolapses initially
B– Further straining produces annular prolapse
C—Continued straining produces blood stained mucus

referred to as a *partial prolapse of the rectum* Rarely the whole rectum invaginates itself outside the anal orifice to form a *complete prolapse of the rectum* Dickson Wright (1950) says of this latter condition It is hard

to think of a complaint more calculated to bring one s grey hairs with sorrow and relief to the grave

## PARTIAL PROLAPSE OF THE RECTUM



FIG 153
Partial prolapse of rectum Mucous membrane appears on right side of anal orifice

### Surgical Pathology of Partial Prolapse of the Rectum

The cause of partial prolapse of the rectum is uncertain in many cases Typically the prolapse appears to be independent of haemorrhoids It is more common in child hood than in adult life childhood prolapse usually corrects itself spontaneously although occasionally it persists and either remains as a partial prolapse or develops into a complete prolapse (Fig 151) In these cases of idio pathic prolapse of the rectum a complete ring of rectal mucosa might protrude but in others it is half or less of the circumference (Figs 152 153)

If the anal sphincter is badly damaged a localised prolapse at the site of injury is common such an injury could occur from being impaled on a



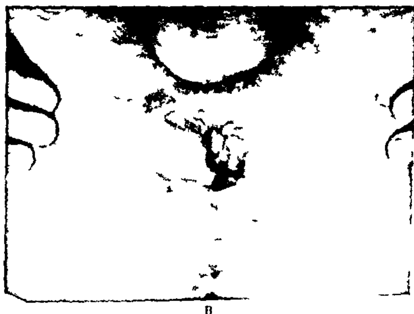
FIG 154
Mucosal prolapse following complete tear with childbirth forty years previously

spike from complete perineal tears in childbirth (Fig 154) or as a result of the treatment of ischio rectal anal fistulae where a large portion of the muscle

has to be divided during operation for radical cure (Fig 155) In these latter cases the prolapse does not seem to change with the passage of years



A



B

Fig 155

Fourteen months after excision and skin graft for bilateral ischio rectal anal fistula Function normal Note small mucosal prolapse posteriorly at site where track was laid open into anal canal
A—Close up view B—General view

## Symptoms and Signs of Partial Prolapse of the Rectum

The symptoms of partial prolapse of the rectum are similar to those caused by internal haemorrhoids

Inspection usually reveals a normal anus but palpation may detect a weakness in the contraction powers of the anal sphincter muscle On straining particularly when the proctoscope is passed the reddish pink rectal mucosa appears independently of internal haemorrhoids but no amount of straining by the patient will cause more than two or three centimetres of mucous membrane to appear

**Diagnosis of Partial Prolapse of the Rectum**

A partial prolapse of the rectal mucosa should be distinguished from internal haemorrhoids because the results of operative intervention are less satisfactory in the former condition further more it should not be confused with complete prolapse of the rectum because the method of treatment is different

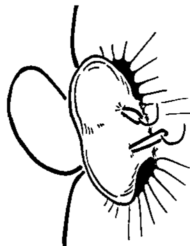


Fig 156
Goodsall s ligature for prolapse of mucosa with wide pedicle

Internal Haemorrhoids —In partial pro lapse of the rectum any segment may be affected and not necessarily the left lateral right anterior and right posterior zones so constantly involved in haemorrhoids The prolapsed rectal mucosa has a wide pedicle (Fig 153) and is pink or light red in colour whilst the prolapsed anal canal mucosa of a haemorrhoid has a narrow pedicle and is more plum-coloured

Complete Prolapse of the Rectum —A ring prolapse of the rectal mucosa may cause some confusion but it is unusual for it to be greater than two to three centimetres in length Proctoscopy fails to reveal any significant anterior wall prolapse

**Treatment of Partial Prolapse of the Rectum**

When the nature of the patient s condition has been explained to him and he has been reassured that there is no malignancy present treatment may be deemed unnecessary by the patient

If however active treatment is demanded the prolapsed mucosa may be excised in the same way as is done for internal haemorrhoids The broader attachment of mucous membrane may make it unwise to apply a simple ligature unless it be applied in the way recommended by Goodsall wherein the ligature is accomplished in three sections (Fig 156) In complete ring prolapse the surgeon may excise the prolapse and perform an end to-end suture although this procedure must be done carefully otherwise the sphincter mechanism will be damaged and the functional result prove unsatisfactory

Partial Prolapse of the Rectum in Childhood —After explaining the nature of the condition to the child s mother she is reassured and is told

in simple language the physiology of defaecation Defaecation should be encouraged when the desire is there and not at some time decided upon by the mother The child is placed on the seat with the buttocks more or less together and the act kept as brief as possible Constipation may need correction but this is done by attention to diet rather than by prescribing aperients

If despite these measures the patient should continue to experience discomfort more active steps can be taken to control the prolapse Injection of the submucosa with five per cent phenol in the same way as is done for internal haemorrhoids will usually bring relief In the very young child this might have to be done under anaesthesia but most older children tolerate the passage of the proctoscope and the subsequent injection without distress

## COMPLETE PROLAPSE OF THE RECTUM

### Surgical Pathology of Complete Prolapse of the Rectum

Although the initiating cause of a complete prolapse of the rectum is not known the manner in which it progresses is reasonably clear

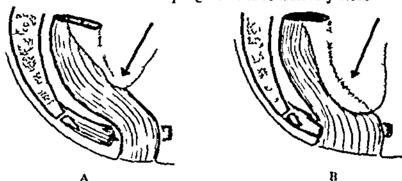



FIG 157

A—If pelvic aperture be normal in size intra abdominal pressure pushes the anterior wall of rectum against posterior wall pubo rectalis and coccygeal raphe in the midline
B—As pelvic aperture and anal orifice widen intra abdominal pressure is directed towards defect rather than levator muscle

The abdominal cavity has been constructed to withstand high pressures created by the plunging diaphragm and tight contractions of the abdominal wall musculature With the fluctuating intra abdominal pressure the permanent orifices transmitting such structures as the oesophagus rectum and spermatic cord require additional protection and this is usually achieved at least in part by some sphincteric mechanism If this mechanism should fail to close the orifice sufficiently peritoneum bulges into it in the same way as the weak part of a balloon bulges when it is inflated

The *pelvic aperture* is the gap in the pelvic musculature and fascial floor through which the rectum passes to the exterior The edges of this U shaped aperture are formed by the pubo-rectalis and pubo-coccygeus muscles the aperture is crowded forwards between the pubic rami and is only about three centimetres wide and four centimetres long

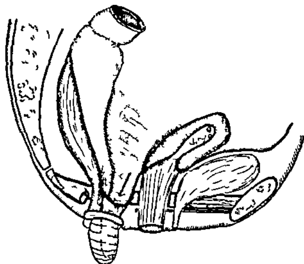


Fig 158
Complete prolapse of rectum is a hernia through anterior wall of rectum

The unprotected part of the aperture is situated posteriorly and transmits the rectum in the male and rectum and vagina in the female If the aperture is small (Fig 157 A) there is an effective shutter mechanism but when it becomes enlarged there is no longer a barrier for the downward fall of the anterior wall of the rectum (Fig 157 B) For a while the anal sphincter muscle acts as an efficient truss Sooner or later gradually or suddenly it gives way and the rectum prolapses beyond the anus At first only the anterior wall of the rectum is involved but with repeated prolapse the posterior segment is dragged down and the rectum and anal canal finally turn completely inside out (Figs 158 159 160)

The daily prolapse widens the pelvic aperture and the patient often becomes incontinent although this may not be noticeable to the patient because of the plugging effect at the pelvic aperture

Although some surgeons refer to partial prolapse as first degree prolapse and to complete prolapse as second degree prolapse or third degree prolapse this does not seem to be the sequence of events because generally a partial mucosal prolapse does not proceed to a complete prolapse In the early stages of the latter the anterior wall of the rectum prolapses into the lumen of the rectum subsequently it may or may not progress outside the anal orifice With this initial anterior wall prolapse of the rectum the patient complains of unsatisfied defaecation because the more he strains at stool the more completely is the rectum filled by the hernia in the anterior wall



Fig 159
Complete prolapse of rectum

**Aetiology of Complete Prolapse of the Rectum**

This is uncertain but it seems that one or more of three factors are concerned

1 Failure of Fascial Supports of the Rectum —The rectum is supported by several well-defined fascial structures Condensation of fascia around the middle haemorrhoidal vessels forms the *strong lateral ligaments* Anteriorly the fascia of Denonvilliers is arranged in sheets extending from the peritoneal reflection to the levator ani and laterally fusing with the lateral ligaments the lateral and *inferior* edges of this fascia are particularly strong and require sharp division in removal of the rectum A defect in these fascial supports from congenital or acquired reasons may represent the initial phase in complete prolapse of the rectum



Fig 160
Complete prolapse of rectum in male forty two years

2 Deep Pelvic Floor —At operation *the rectum is found to have almost* a complete peritoneal investment down to the sacro-coccygeal region furthermore there is a well-developed mesorectum along the whole length of the rectum The sacral cavity is covered by peritoneum whilst the posterior wall of *the vagina is similarly covered to the* level of the levator ani muscle It is possible that this unusual arrangement *of the peritoneum* is an acquired characteristic but this might not be so certainly the peritoneal reflection is closer to the levator ani muscle in the *early stages of embryonic development* and this disposition might persist Muir (1955) points out that the presence of the complete meso rectum results in obliteration of the sacral curve and the rectum proceeds more or less straight to *the pelvic aperture* so favouring the development of the prolapse In the early embryos the peritoneal reflection extends to a lower level than it does in the adult

3 Enlarged Pelvic Aperture —The pelvic aperture in the *female* transmits the vagina in addition to the urethra *and rectum* and hence is relatively wider and the fact that for every male patient with prolapse of the rectum there are five or six females suggests that this is important Nevertheless it is interesting to observe that amongst *the females* suffering from

this condition there is relatively high incidence of non parturition in fact one of every three female patients with complete prolapse have not borne children (Hughes 1950)

4 WEAKNESS OF THE MUSCLE SURROUNDING THE PELVIC APERTURE — No primary muscular lesion affecting the levator ani has been discovered but such has been suspected Old age does not seem to be significant from this point of view because the lesion is not confined to the elderly in males the maximum age incidence is in the second and third decades although in females it is later

Complete rectal prolapse may complicate organic lesions of the spine Butler (1954) described two young women in whom the condition developed after removal of a cauda equina lesion

**Symptoms of Complete Prolapse of the Rectum**

PROLAPSE —The patient is nearly always aware of the prolapse which appears with defaecation and sometimes independently of it and which may or may not return spontaneously *Nevertheless despite the large size of the prolapse some seem genuinely ignorant of its presence so that the absence of this symptom does not mean that a prolapse can be excluded* The prolapse is usually about six inches long (Figs 159 160) and whilst the patient might find that it descends with increasing ease it does not become larger as a rule after it has first appeared Very rarely the prolapse becomes strangulated (Neve 1953)

INCONTINENCE —Incontinence is a common symptom but often does not trouble the patient until after an operative intervention on the prolapse The patient complains that flatus escapes uncontrollably and that faecal pellets fall from the rectum without warning

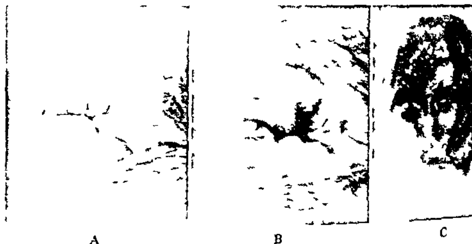
BLEEDING —A small amount of blood is lost with the motion and blood stained mucus may soil the underwear if the prolapse appears with an effort not related to defaecation The presence of the bleeding often alarms the patient and leads him to feel that a cancer has developed

PAIN —A large prolapse is usually responsible for considerable discomfort especially when it returns suddenly and spontaneously at the end of straining at defaecation

UNSATISFIED DEFAECATION —*An anterior wall prolapse of the rectum which does not project beyond the anus is responsible for unsatisfied defaeca tion* and repeated attempts are made to expel what seems to be a motion The more the patient strains the less satisfactory is the evacuation of the bowels because the anterior wall of the rectum obstructs the passage of the faeces The patient sometimes learns to insert a finger into the anal canal and push away the wall of the rectum so that satisfactory defaecation becomes possible

## Physical Examination in Prolapse of the Rectum

If the history is short the anus may look normal and there ma detectable weakness of the anal canal (Fig 161 A) But in many c



A B C

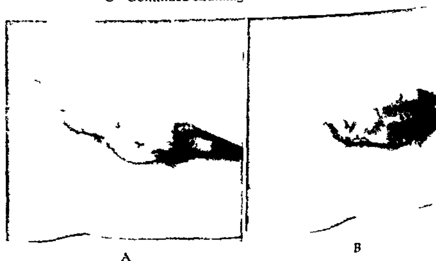
Fig 161

Miss L B twenty six years Prolapse of rectum six months duration

A—Anus prior to straining (left lateral position)

B—On straining perineum bulges.

C—Continued straining causes rectal mucosa to appear



A B

Fig 162

Miss L B twenty six years. Prolapse of rectum of six months dura

A—Patient resting

B—Noticeable bulging of perineum on strainin

certainly in those of longer duration the anus is patulous no tone felt in the sphincter muscle and digital traction at the anal verge c anal canal to gape open

When the patient strains the perineum bulges and som markedly (Figs 161 B 162) the anus opens and the rectal mucosa app 161 C) As the straining continues the whole prolapse descends an

reaches its full length of some six to nine inches In a small rectal prolapse the orifice of the prolapsed bowel lies a little posteriorly but in large complete prolapse it is at the apex of the prolapse (Figs 159 160)

Proctoscopic examination reveals a normal mucosa but if recently re placed after prolapsing the mucosa of the rectum may be oedematous and possess multiple petechial haemorrhages When the patient strains with the proctoscope in place the clinician can appreciate the bulging in the anterior wall of the rectum as the initial step in the appearance of the prolapse Procto scopic examination is the only satisfactory way of detecting the anterior wall prolapse of the rectum which does not descend any further than the anus in such a case the anterior wall can be brought to the anal verge and sometimes just beyond but as soon as the patient relaxes the prolapse promptly disappears

**Diagnosis of Complete Prolapse of the Rectum**

The typical prolapsed rectum offers no diagnostic difficulties The pro lapse has a conical shape with the orifice at the apex on the sides of the cone are circular ridges in the mucosa which is bluish red in colour at the base of the cone the mucosa becomes continuous with the skin Although tumours may prolapse and simulate rectal prolapse the difference between the two conditions is obvious

DIAGNOSTIC ERRORS MAY BE MADE IN TWO CIRCUMSTANCES —*Prolapse is not a symptom of the patient* If the patient is not aware of or does not admit to any prolapse the only indication of its presence may be an ab normally relaxed anal sphincter muscle The condition might be overlooked even on the most careful examination Useful signs in these cases are the patulous anus as demonstrated by traction on the anal verge with the fingers the bulging perineum when the patient strains and the descent of the anterior wall observed at proctoscopy

*Anterior Wall Prolapse of the Rectum* —Anterior wall prolapse which does not descend beyond the anus may escape recognition The patient complains of unsatisfied defaecation but a rectal examination may seem to be negative Proctoscopy however is diagnostic for when the instrument is passed and the patient strains the descent of the anterior wall is obvious

## TREATMENT OF COMPLETE PROLAPSE OF THE RECTUM

**History**

Treatment of complete prolapse of the rectum has passed through *three phases* The *first* ended at the beginning of the nineteenth century up to this time treatment consisted for the most part of advice as to how to prevent the prolapse from appearing John Arderne referred to prolapse of the rectum as going out of the lure he advised the local application of unguentum apostolorum so called because it had twelve ingredients and claimed that with it King Henry of England was cured Thomas Vicary (1626) wrote

A remedie for falling out of the fundament *First beware of taking cold in that place* and beware of costiffnesse and keep the Arse and Buttocks warm and sit not on the cold earth nor upon stone or stones *nor upon any hard thing but take* somewhat under the buttocks not only for falling out of the Loncation or Arsegut but for all other infirmities that may be in the *Longation engendered*

(quoted by Muir 1955) Wiseman in 1676 suggested that two sticks be carved in such a way that they could be used to prevent prolapse during defaecation and Morgagni in a book written by him when he was eighty years of age described a truss made of soft leather and iron wings which was designed to hold up the prolapse

With the development of surgery in the nineteenth century the *second era* of treatment of prolapse of the rectum saw more active attempts made to cure the lesion but the cause and mechanism of the prolapse were not understood so that the operations were mostly unsatisfactory in practice Salmon (1831) fixed the prolapse by transfixing it with two long pins inserted at right angles to one another whilst he excised the mucous part of the prolapse but was careful not to injure the muscle Mikulicz (1888) and Miles (1933) popularised perineal amputation of the prolapse a procedure that came to be known as *rectosigmoidectomy* This very radical amputation was widely practised until recently when the poor results of the operation were realised Lockhart Mummery (1910) attempted to fix the rectum to the anterior wall of the sacrum by dissecting upwards between the coccyx and sacrum and the rectum and allowing the resulting cavity to heal by granulation tissue this operation proved a complete failure Thiersch in *1891* narrowed the anus with a silver wire placed in the perianal space a procedure revived by Gabriel in 1948 and still occasionally used in very infirm patients Diathermy of the mucosa excision of strips of mucosa submucous perirectal and retro rectal injections and attachment of the colon to the iliac fossa are some of the numerous procedures which have been advocated

The *third era* in the treatment of prolapse of the rectum began with an account of rectal prolapse by Alexis Moschowitz in 1912 He pointed out that where the rectum left the abdominal cavity there was a naturally weak point in the transversalis or pelvic fascia An increase in the intra abdominal pressure might force the peritoneum into the sheath formed by the outward prolongation of the pelvic fascia This would come to indent the anterior wall of the rectum and with continued pressure the path of least resistance to the herniation was through the anal orifice through which the anterior wall of the rectum appeared followed by the complete rectum Moschowitz proceeded to advocate obliteration of the hernial sac through an abdominal approach in doing this he laid particular stress on the pelvic fascia and did not consider that the levator ani muscle played much part in the prolapse Roscoe Graham (1942) sutured the levator ani muscles together from above The peritoneum in the pouch of Douglas was incised the inner edges of the two levator ani muscles were identified and then sutured together with interrupted silk sutures The peritoneal floor was resutured at a higher level The procedure

was technically difficult because of the distance of the levator ani muscle from the operator Lloyd Davies (1949) also advocated an abdominal operation and advised obliteration of the deep pelvic peritoneal pouch and the reformation of the rectovaginal septum with floss silk sutures placed between the rectum and vagina these sutures take the form of slings which are firmly attached to the sacrospinous ligaments at the sides of the rectum Muir (1955) describes another abdominal procedure the deep pouch of Douglas is excised the pelvic peritoneum is stripped up the rectum mobilised and resected or otherwise fixed so that it can obtain a secure attachment to the pelvic walls

McCann (1928) described a procedure performed through a perineal approach which was designed to repair the defect in the pelvic aperture through an incision in the posterior vaginal wall the levator ani muscle was defined and sutured anterior to the rectum Cohn (1942) and Gabriel (1949) have both added to the standard perineal amputation or recto-sigmoidectomy suture of the levator ani muscle in front of the rectum

From observations made at operation for complete prolapse of the rectum and from a study of the investigations undertaken by others it seems that removal of the hernial sac and repair of the defect are essential steps in curing a complete prolapse of the rectum But it does not seem practical to accomplish this satisfactorily by an operation conducted entirely either through a perineal or an abdominal approach For this reason a number of surgeons have described combined procedures

## Combined Abdomino-Perineal Repair of Complete Prolapse of the Rectum

In half of Moschowitz s patients some type of perineal operation was combined with the closure of the pouch of Douglas (Moschowitz 1912) Dunphy (1948) pointed out the difficulty of dealing with the hernial sac from below and of performing a suitable repair of the defect in the pelvic aperture from above He described an operative procedure done in two stages through a perineal approach the prolapsed segment of the rectum was excised the hernial sac removed and the levator ani muscle anterior to the rectum sutured Some days later the abdomen was opened the rectum mobilised the transversalis fascia sutured the hernial sac and pouch of Douglas closed by circular sutures and the pelvic colon fixed to the lateral wall of the pelvis He quoted four cases treated satisfactorily by this method although twenty months was the longest period of time that any patient was observed Butler (1954) reported that he had performed a combined rectosigmoidectomy on five cases without recurrence (longest follow up was two years) he recommended a lithotomy Trendelenburg position mobilisation and excision of the sigmoid colon and rectum from above end to-end anastomosis from below repair of the levator ani muscle from below and complete obliteration of the hernial sac from above

## Synchronous Combined Abdomino-Perineal Repair of Prolapse of the Rectum

*In association* with his colleagues Leslie Gleadell F R C O G and John Turner F R C S the writer has treated twenty-one patients suffering from complete prolapse of the rectum by a synchronous combined abdomino-perineal repair with one surgeon operating on the perineum and the other on the abdomen This synchronous combined repair is greatly facilitated by the lithotomy Trendelenburg position provided by the Lloyd Davies stirrups

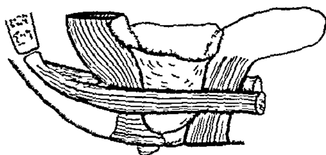


Fig 163
Complete prolapse of rectum Peritoneal sac invaginates anterior wall of rectum

**Steps in the Synchronous Combined Abdomino Perineal Repair**

1 Excision of the Hernial Sac—The fundus of the sac is first freed by the perineal surgeon and is then passed through to the abdominal surgeon for a more complete dissection and excision It has been observed at operation that attempts to remove the hernial sac entirely from below are very imperfect (Figs 163 164 165 166)

2 Repair of the Pelvic Floor—The pelvic aperture is widened by the repeated descent of the prolapse and it is reasonable to repair this defect because even if it is not actually responsible for the prolapse it may play an important role in recurrence This repair is comparatively easily effected by the perineal surgeon suturing the levator ani together anterior to the rectum (Fig 167)

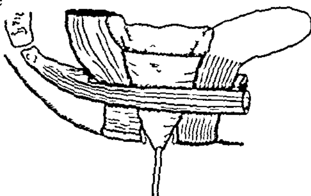


Fig 164
Complete prolapse of rectum Fundus of peritoneal sac identified from perineum

3 Suture of the Pelvic Fascia—After mobilising the rectum the pelvic fascia is sutured anterior to the rectum This fascial repair extends from the upper surface of the sutured levator ani to the level of the uterine cervix in the female and the upper portion of the seminal vesicles in the male (Figs 167 168 169)

4 Increasing the Forward Angulation of the Ano-Rectal Junction—As the pelvic aperture increases in size the forward angulation of the rectum at the ano rectal junction caused by the puborectalis sling is decreased

as a result direct pressure on the anterior wall of the rectum meets with little resistance because the force is directed directly upon the anal orifice (Fig 157) By suturing the pubococcygeus together behind the rectum this angulation is restored (Fig 170)

**Pre operative Treatment**

These patients receive the same pre-operative treatment advised for carcinoma of the rectum and should be admitted to hospital some three to five

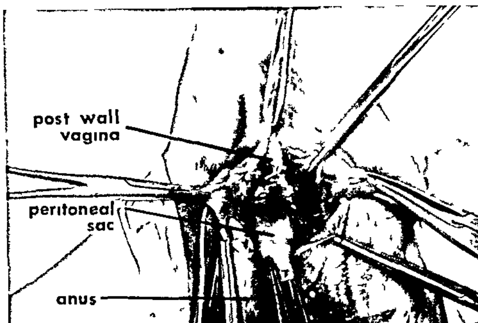



Fig 165

Perineal dissection in combined abdomino perineal repair for complete prolapse of the rectum Posterior wall of vagina held forward and fundus of sac dissected from surrounding structures

days before operation depending on whether they are robust or frail The operation is not as formidable as it seems but nevertheless intravenous infusion during the course of the operation is a wise precaution a pint of blood should be available and if the haemoglobin concentration is low initially this should be supplemented by a second pint The bladder is emptied and in the male patient a catheter is retained in the urethra before commencing the operation

**Technique of Operation in the Female Patient**

An incision is made by the perineal surgeon between the vagina anteriorly and the anal canal posteriorly It is deepened through the skin subcutaneous tissue and the fibrous tissue of the perineal body and almost at once the peritoneal sac is seen related to the anal canal posteriorly and the vagina anteriorly The sac is partly separated from both these structures and the fundus opened

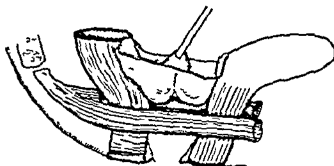


FIG 166

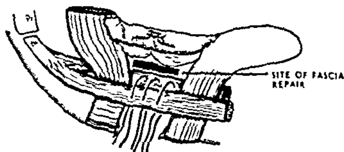



FIG 167

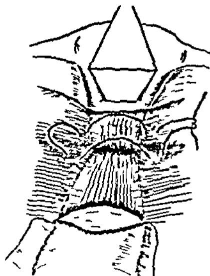


FIG 168

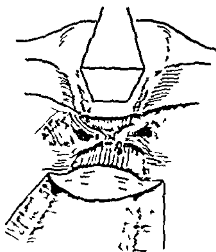


FIG 169

FIG 166—Complete prolapse of rectum Sac withdrawn into abdominal cavity

FIG 167—Complete prolapse of rectum Levator ani muscle sutured pelvic fascia repaired and peritoneal sac obliterated

FIG 168—Repair of prolapse of rectum Suture of pelvic fascia between rectum and vagina Suture embraces lateral ligaments of rectum and tissue on either side of vagina

FIG 169—Repair of prolapse of rectum Pelvic fascia sutured between rectum and vagina The first suture has been tied

The abdominal surgeon in the meantime has opened the abdomen through a lower midline incision The intestines are packed clear of the pelvis and the pelvic floor exposed Behind the uterus and vagina is the deep peritoneal sac the lower limit of which is difficult to see Behind is the rectum which often appears narrow and is covered with peritoneum completely except for the meso rectal attachment The abdominal surgeon passes a pair of long forceps into the peritoneal pouch and through the opening in the fundus The perineal surgeon indicates the edge of the opening in the sac which is grasped with the forceps and then with drawn upwards into the peritoneal cavity By blunt dissection the peritoneal sac is further separated from the vagina anteriorly and the rectum posteriorly until the neck of the sac is level with the cervix of the uterus which is the level at which it will be removed

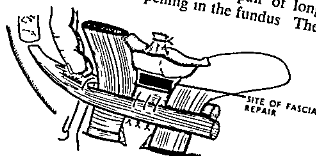



Fig 170

Complete prolapse of rectum Ischio-coccygeus muscle and fascia of Waldeyer sutured behind rectum in order to increase angulation at ano rectal junction

To repair the pelvic floor the perineal surgeon carries the dissection upwards between the rectum and vagina and defines the puborectalis muscle a series of interrupted sutures is inserted across the aperture and through the muscle so reducing the size of the defect The fascia of Denonvilliers is sutured the perineal body reconstituted and the skin and vaginal walls sutured

The abdominal surgeon extends the incision in the fundus of the peritoneal sac upwards along either side of the rectum These upward extensions of the peritoneal incision are deepened through the extraperitoneal tissue into the presacral space and the hand is passed behind the rectum as far as the levator ani muscle At the level at which it passes through the levator ani muscle the rectum is pushed forward by blunt dissection so that a gap can be felt in the two halves of the levator ani behind it

The perineal surgeon makes a longitudinal incision behind the anus and deepens it through the subcutaneous tissue to the coccyx and ano-coccygeal raphe By further blunt dissection the fingers of the abdominal surgeon which have been thrust through the levator ani behind the rectum are identified The pubococcygeal portions of the levator ani are sutured behind the rectum with interrupted chromic catgut sutures The post anal wound is closed with catgut

The abdominal surgeon proceeds to suture the fascial tissue on either side of the rectum together in front of the rectum with interrupted silk sutures These sutures may take the form of a series of purse strings which bite the fascia on one side of the rectum the fascia on the other side of the rectum

and finally the fascia on either side of the vagina (Figs 168 169) If this is not possible sutures of heavy silk can be passed through this tissue from one side across in front of the rectum to the other side and tied loosely

The redundant peritoneum in the floor of the pelvis is overlapped with a continuous fine silk suture so obliterating the pouch of Douglas The omentum is brought down over the pelvic floor and the abdomen is closed in layers

### Technique of Operation in the Male Patient

A transverse incision in the perineum is made just anterior to the anus and is deepened through the subcutaneous tissue just behind the transverse perineal muscles A catheter in the urethra identifies this structure as the dissection proceeds upwards in search of the peritoneal sac When it is found it is separated off the rectum posteriorly and the prostate anteriorly and is passed through to the abdominal surgeon The edges of the levator ani are sutured together anterior to the rectum

The abdominal dissection and the post anal perineal dissections proceed in the way described for the female patient

### Post operative Treatment

The patient will require morphia to relieve the pain At first the foot of the bed should be elevated on low blocks and these should be retained for two or three days to reduce pressure on the reconstructed pelvic floor The catheter is kept in the bladder until the patient is moving freely The intra venous therapy need not be maintained for more than an hour or two after the operation The incidence of infection in the perineal wounds is relatively high but prophylactic penicillin and streptomycin is effective in reducing the severity of such infection The patient should be kept in bed for ten days after the operation and then allowed home on the fourteenth day but is advised to avoid arduous exercise for two or three months

## EXCISION OF THE UPPER RECTUM AND SIGMOID COLON

The apparent redundancy of the rectum and sigmoid colon have prompted surgeons to excise the affected portion of the bowel This has been accom plished by Mikulicz Miles and Gabriel by means of perineal amputation whilst Muir and Butler carry out the excision from above The writer does not believe this step is necessary for a good result but realising that it can be accomplished without increasing the mortality of the operation he has kept an open mind on the matter for two reasons Excision of the upper rectum and lower sigmoid colon may permit a more efficient removal of the hernial sac whilst in addition it might help to lower the incidence of mucosal prolapse which is often seen in the post-operative period when a combined repair is done without excision of the bowel The excision and anastomosis can be effected through the abdominal incision without otherwise modifying the procedure adopted

**Post operative Sphincter Function**

The constant stretching of the anus by the prolapse is responsible for a grossly patulous orifice with little power of contraction A finger placed into the anal canal can feel the contractions of the levator ani but those of the anal sphincter muscle seem non-existent It is not uncommon for the patient to complain of complete incontinence after operations for prolapse of the rectum This defect is probably due to the removal of the prolapse which acts as a plug in the anal canal it does not seem likely that the over stretched sphincter muscle could be damaged much more by surgery If there has been an excision of a large segment of the rectum it means the loss of an important sensory receptor and complicated reflexes are thereby disturbed

### Treatment of Anterior Wall Prolapse of the Rectum

Anterior wall prolapse of the rectum is treated in the same way as the complete prolapse because the former appears to be a phase in the development of the latter The results of treatment in these cases are excellent

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Recurrence after simple amputation of the prolapse is most common in the first twelve months after operation but a number remain apparently cured for three four or five years and occasional cases do not recur until ten years or more have elapsed so making evaluation of any method a difficult procedure The most that can be said of the synchronous combined repair without rectosigmoidectomy is that the recurrence rate in the first three years after the operation is very low The longest period of time such a case has been followed up is five years and the result has remained excellent

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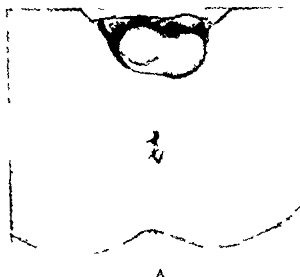
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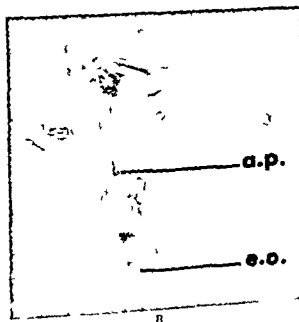

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# PRURITUS ANI

A NUMBER of lesions of the anal canal and rectum cause an itchiness around the anus which is relieved as soon as the cause is found and



A



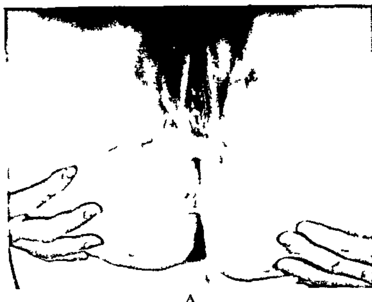

B

Fig. 171

Pruritus ani. Close inspection revealed an anal polyp (a.p.) and external orifice of a perianal fistula (e.o.)

removed (Fig. 171) and occasionally such systemic diseases as diabetes mellitus and vitamin B deficiency are responsible. The term *pruritus ani*, however

is given to that condition in which the anal itchiness is the symptom causing the patient to seek relief but when examined no cause can be discovered



A



B

Fig 17.

A—Chronic pruritus ani surrounding anus but most extensive posteriorly

B—Close up view to show thickened skin oedematous folds of skin radiating from anus and superficial abrasions

**Surgical Pathology**

There are two main manifestations of the disease acute and chronic

ACUTE PRURITUS ANI —Surrounding the anus there is a dermatitis patchy or diffuse dry or weeping and which extends forwards on to the posterior aspect of the scrotum or around the vagina Laterally and posteriorly it involves only the skin in apposition in the natal cleft

CHRONIC PRURITUS ANI —In chronic pruritus ani the changes are more closely related to the anus but again may be patchy or diffuse in distribution Three degrees of severity can be distinguished

1 *First Degree Chronic Pruritus Ani* —The skin has an almost normal appearance but on closer inspection three changes may be observed The folds of skin radiating from the anus are more accentuated than normal owing to oedema the skin possesses a distinct pallor because of epidermal thickening and scattered around the anus are small very superficial ulcers often linear in shape and which appear to have been caused by scratching or chafing

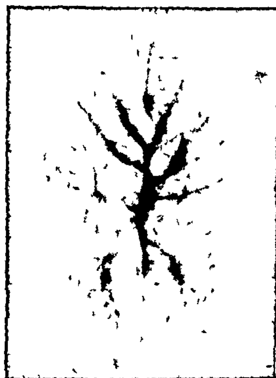


FIG 173
Advanced chronic pruritus ani

2 *Second Degree Chronic Pruritus Ani* —The changes are similar to the above but are more advanced The oedema of the skin folds and the thickening of the skin are very marked (Fig 172)

3 *Third Degree Chronic Pruritus Ani* —In advanced long standing cases the appearances are those of leukoplakia elsewhere The skin is coarse and white The changes may be localised or diffuse and may extend to the level of the mucocutaneous junction within the anal canal (Fig 173)

**Microscopic Pathology**

The epidermis is thickened this is caused by proliferation of the prickle cells hyperkeratosis and patchy parakeratosis The rete pegs are elongated whilst the dermis shows a generalised but mild infiltration with inflammatory cells

**Symptoms of Pruritus Ani**

The itchiness is usually most marked in the evening and at night in bed During the day when the patient is occupied at work the symptom is not so troublesome Warm weather and woollen clothes aggravate the condition

Scratching is often responsible for some bleeding which soils the under wear

**Signs in Pruritus Ani**

Nearly always typical skin changes can be seen as soon as the buttocks are retracted although in the milder chronic cases careful inspection may be necessary The skin shows accentuated skin folds whitish discoloration and superficial abrasions

**The Importance of Complete Ano Rectal Examination**

Even though simple inspection of the anal region permits a diagnosis proctoscopy and sigmoidoscopy must not be omitted Apart from the need of excluding any possible causative factor the patient cannot be given a definite assurance that malignancy is not present without such investigation

## TREATMENT OF PRURITUS ANI

The treatment of pruritus ani is so unsatisfactory that the patient with this complaint is not likely to meet with an enthusiastic reception when he visits the doctor and it is quite probable that he will find it necessary to consult a number of specialists and spend much money on ointments and lotions and other forms of treatment before obtaining results Even then complete cure may still prove evasive the disease classified as psychosomatic and the patient ordered psychiatric treatment

If the problems presented by pruritus ani are kept in their proper perspective the practitioner who elects to treat this disease need not feel defeated at the outset In all but a small minority of cases the condition can be brought under control by an approach involving four stages

1 **Reassurance of the Patient that there is No Malignancy**

In a very large number of cases the patient believes that he either actually has developed cancer or will do so if the itchiness is not controlled The young are just as likely as the old to entertain this anxiety The notoriety of the symptom has often resulted in a series of very cursory examinations which have done nothing to dispel a growing fear in the patient s mind

After a thorough general physical examination the patient with pruritus ani must be given a complete ano rectal examination including sigmoidoscopy At the conclusion of this exhaustive examination he is emphatically informed that there is no question of malignancy This information is conveyed very confidently so that the patient is convinced It is useless and unfair to give such a reassurance without a complete ano rectal examination

In few contributions on the subject of pruritus ani is any reference made to the anxiety in the patient s mind concerning cancer This fear does not represent an abnormal reaction on his part too often he is termed introspective and his complaint psychomatic

A positive assurance that there is no malignancy and simple advice on the subject of anal hygiene will satisfy a very large number of sufferers with pruritus ani Symptoms persist but they no longer assume a place of importance in the patient s thoughts In a few cases examination will disclose an obvious cause such as anal fistula third degree haemorrhoids threadworms etc and naturally such will be attended to without delay

## 2 The Application of Soothing Lotions and Ointments

If symptoms continue to trouble him the patient is asked to return in four weeks time An antipruritic ointment such as Xylocaine five per cent (Astra Sweden) is prescribed or a lotion such as lotio calaminae which contains one per cent phenol As a rule the individual clinician has his own special preparation but it is wrong to order any application without a complete ano rectal examination and without advising the patient on anal hygiene *Antihistiminics fungicides antibiotics and hydrocortisone may be tried at this* stage but the results vary (Brossy 1953)

## 3 The Application of Elastoplast Strips to the Buttocks to Prevent Chafing

Those whose symptoms persist require more active treatment Relief may be obtained and sometimes in dramatic fashion by applying elastoplast strips to the buttocks in such a way as to hold them apart so preventing the continual chafing around the anus



Fig 174
Adhesive straps to keep buttocks apart

Two or three strips of adhesive strapping each about ten inches in length are applied on each side the inner side of each strip is placed just outside the pruritic area and with traction on the buttocks the strapping is *gradually attached to the skin with the outer end of the strip* in the region of the greater trochanter Patients can tolerate this strapping for several days before discarding it Some re apply the strapping on their own initiative when and if symptoms return (Fig 174)

Strapping the buttocks apart in this way has proved a very useful procedure in some cases especially when the pruritus is acute It should be tried also in chronic pruritus ani particularly when a wide area is affected and the surface is moist In some obese subjects it is difficult to keep the buttocks apart without ordering the patient to bed

**4 Excision of Pruritic Area and Skin Graft**

If symptoms persist despite these preliminary measures serious consideration must be given to surgery

Injections with alcohol (Lees Ferguson 1952) X ray irradiation skin undercutting operations and nerve sections have not proved very satisfactory although they are occasionally practised

If the pruritus ani is associated with chronic oedema of the skin accentuating the radiating skin folds of the anus it may prove feasible to excise these folds and close the resulting wounds by primary suture This obliterates the intervening grooves in which the skin is moist and excoriated and which as a result may be responsible for some of the irritation

In advanced third degree pruritus ani the area of skin needing excision is too large for closure by this means (Wallis 1911) but primary closure of the wounds can still be obtained by skin grafting This operation although tedious is not a formidable procedure and in nearly every case the graft will be found at first dressing to have taken completely The introduction of skin grafting as a primary procedure in the management of wounds in this area has placed excision of the pruritic area on a sound and practical basis

PRE-OPERATIVE TREATMENT FOR EXCISION OF PRURITIC SKIN AND SKIN GRAFT —The patient is given succinylsulphathiazole (May & Baker) two and a half grams four times daily for the five days preceding the operation and admission to hospital is arranged for the day before operation No bowel treatment is given other than advising the patient to have a bowel action just before the operation The thighs are shaved but if local discomfort is considerable the perianal region may be left unprepared until the patient is anaesthetised

TECHNIQUE OF EXCISION OF PRURITIC SKIN AND SKIN GRAFT —The patient is anaesthetised and then placed in the lithotomy position and draped for operation Excision commences posteriorly so that the blood flowing down does not obscure the operative field The tissue excised is quite superficial and extends from the outer visible edge of the pruritic area right into the anal orifice as far as the anal groove

If the area is localised to one quadrant of the anus the operation presents no difficulty but if it extends right around the anus the surgeon should prefer to perform the excision in stages rather than create circumferential skin loss (Fig 175 A B)

After the excision has been completed haemostasis is secured by pressure and by ligatures of fine catgut Thin sheets of skin are cut from the thighs and laid on the wound and are sutured in place with fine interrupted silk threaded on round bodied or cutting-edged needles (Fig 175 C) The space between the graft and the wound is thoroughly syringed with saline to remove all blood clot after which tulle gras and strips of cotton wool moistened in saline are packed into the wound over the graft and are kept firmly in position

# PROCTITIS (NON SPECIFIC)

THE term *non specific proctitis* is given to an inflammatory condition affecting the mucosa and to a lesser extent the submucosa of the rectum. The symptoms of this disease are characteristic and the diagnosis readily made on sigmoidoscopy. It pursues a relatively benign course despite the fact that it appears to be allied to ulcerative colitis.

On sigmoidoscopy, the lesion is seen as a diffuse inflammatory process involving the rectal mucosa and extending upwards to a level which varies from about eight centimetres to about fifteen centimetres from the anal verge. The transition from inflamed to normal mucosa is well defined and takes place at about the same level around the circumference of the rectum. The mucosa is red and friable and thickened so that the delicate vessels seen normally in the mucosa standing out against the yellowish background are no longer visible. Sometimes the mucosa appears roughened and in such cases the term "granular proctitis" is used. Although the mucous membrane is friable actual ulceration is rarely seen.

The lumen of the bowel contains blood stained serous fluid, some mucus and a little purulent exudate. The rectum is easily distensible suggesting that the inflammatory lesion has not extended deeply.

Histological examination of fragments removed for biopsy shows the mucous membrane to be intact and the mucosa diffusely but not heavily infiltrated with small round cells.

**Course Taken by Proctitis**

Of forty four cases observed by the writer on one occasion only did the inflammation spread upwards to involve the more proximal colon. In the remainder it remained confined to the rectum and after a variable period of time usually resolved spontaneously.

## AETIOLOGY

Certain observations lend support to the view that proctitis is allied to ulcerative colitis. The sigmoidoscopic appearances in proctitis are similar to those in the non ulcerative phase of proctocolitis. Again there is no doubt that a proctitis may spread and involve the colon although this course is unusual. Furthermore in proctocolitis the lesion is usually of maximum intensity in the left half of the colon; indeed it is not uncommon for the caecum and ascending colon to be relatively normal in appearance (Figs. 177, 178) (Hughes and King 1955).

It might be postulated that when the causative agent of proctocolitis is of reduced intensity the resulting lesion is a proctitis, when of average intensity it causes a left sided proctocolitis but when of maximum intensity a severe

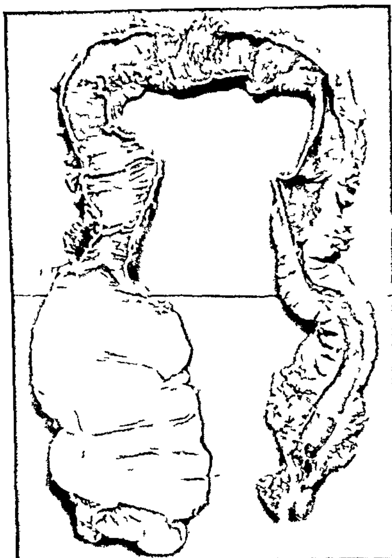


FIG 177

Mr McD forty eight years Ulcerative proctocolitis of twenty years duration recurrent exacerbations Barium clysma in November 1953 showed colon above recto sigmoid junction to be normal second barium clysma in September 1954 revealed extension upwards to involve whole of sigmoid colon On 11th October 1954 one stage proctocolectomy performed Convalescence uneventful Note normal appearance of caecum and proximal ascending colon

diffuse ulcerative colitis is the result (Fig 179) This theory receives support from the histological studies of Lumb and Protheroe (1955)



FIG 178
Mr L D forty four years Ulcerative proctocolitis of ten years duration recurrent exacerbations Barium clysma examination revealed typical involvement of rectum and sigmoid colon but remainder of colon appeared normal radiologically On 23rd December 1954 one stage proctocolectomy performed During apparently uneventful convalescence patient suddenly collapsed and died from pulmonary embolism on 4th January 1955 Note ulcerative proctocolitis extending to descending colon non ulcerative colitis affecting transverse colon and normal appearance of caecum

## CLINICAL FEATURES

In the author s series of forty four cases women were more commonly affected than men the average age of onset in the former was forty three to forty five years and in the latter thirty-eight to forty-one years The youngest patient was nineteen and the oldest seventy two (Table X)

The most common symptom is the passage of *blood with the motions* The amount lost is small and is mixed with the motions However it is persistent and by staining the water in the closet each day causes the patient some alarm

The patient often complains of *diarrhoea* close questioning indicates that there is usually one relatively normal bowel action each day with the passage of a formed motion although it may be covered with traces of blood




Fig 179

Mr H F forty two years Ulcerative p octocolitis of two weeks duration Failed to respond to medical treatment Primary proctocolectomy performed on 21st January 1955 Convalescence uneventful twelve months later gain of eight stones in weight
A—The large bowel B—Close up view of caecum to show severe degree of involvement

This is followed by two or three other attempts to defaecate *usually in the morning* but on each occasion only a small quantity of blood-stained faecal fluid results *The cause for this "diarrhoea" is as follows* when the patient passes flatus a small amount of blood stained faecal fluid escapes involuntarily to avoid this unpleasant experience the patient visits the lavatory whenever rectal sensation demands it The patient may volunteer the statement that he *feels unsatisfied after defaecation* but this is not common

TABLE X

PROCTITIS (Non Specific)

*Author's series of forty four cases of proctitis (non specific)*

| | | | |
|---|---|---|---|
| Female— | 26 cases | Average age 43 to 45 years | |
| Male— | 18 | „ | 38 to 41 |

*Total* 44 cases

| | |
|---|---|
| *Youngest patient* | 19 years |
| Oldest | 72 „ |

Average distance from anus to which proctitis extend d—12 cm

These patients are usually of healthy physique A rectal examination finds the rectum empty of faecal material The mucosa feels warm and smooth *although in the hypertrophic granular form the roughness of the surface can* be appreciated There is some blood on the examining finger Proctoscopic and sigmoidoscopic examination reveal the inflamed mucosa of the rectum this is red and friable but there is no ulceration The upper limit of the inflamed mucosa can be reached and above it the normal mucosa of the sigmoid colon can be seen A barium clysma examination is normal

## DIFFERENTIAL DIAGNOSIS

The *symptoms are very suggestive* of a rectal neoplasm but physical examination excludes this condition There are certain conditions which might cause confusion

### Proctocolitis

This term is used to designate inflammatory lesions of the rectum and colon the upper level of which cannot be reached on sigmoidoscopic examination (Fig 180 A B) *This distinguishes the condition from proctitis where the whole of the inflamed zone is visible* A barium clysma examination in cases of proctocolitis may be normal and it might be assumed that *the upper level of the inflammation is just out of reach* of the sigmoidoscope This may be so but it is *most important to remember that the bowel may be very severely involved in the acute stage of proctocolitis and still appear normal on radiological examination* (Hughes 1956)

Proctocolitis can occur in ulcerated and non ulcerated forms and one appears to be a phase of the other the presence of ulcers will exclude

proctitis but the non ulcerative phase of proctocolitis has a similar appearance to proctitis

**Suppository Proctitis**

Before visiting the surgeon some patients insert a suppository of glycerine in order to clear the bowels The mucosa appears oedematous and is a little friable a clear viscid fluid is often present in the rectum but there is no blood Further questioning reveals the nature of the proctitis

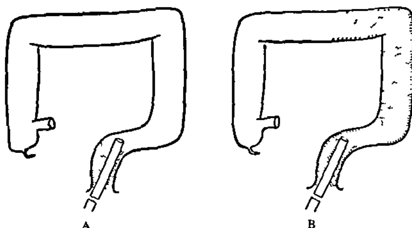



FIG 180
A—Proctitis 1 Usually non ulcerative 2 Sigmoidoscope passes above lesion 3 Rarely extends
B—Proctocolitis 1 Ulcerative or non ulcerative 2 Sigmoidoscope does not pass above lesion 3 Barium clysma may be normal

**Antibiotic Proctitis**

After the administration of antibiotics proctitis may supervene and may last for some months before clearing Aureomycin appears to be the one most likely to cause this complication On sigmoidoscopy the appearance of the mucous membrane is similar to that seen in the idiopathic form

**Complete Prolapse of the Rectum**

Complete prolapse of the rectal walls causes oedema of the rectal mucosa and petechial haemorrhages Sigmoidoscopy shows the mucosa to be pale and in places friable and the vascular pattern is lost The patulous anus and the scattered petechial haemorrhages are suggestive of prolapse of the rectum

**Proctitis Artefacta**

In association with Dr John Bolton the author has seen a patient in which a proctitis had been inflicted by the patient herself It was not the only lesion in this case as she developed multiple bruises over the legs and arms The rectum showed a patch of proctitis in the middle third caused by

the impingement of a pencil on the under surface of the middle valve of Houston. There was an exuberance of granulation tissue at this site.

**Venereal Proctitis**

This is an unusual lesion. The symptoms of proctitis follow exposure to infection either gonococcal or syphilitic. Examination may reveal palpable glands in the hollow of the sacrum. There may or may not be involvement of the perianal skin. Sigmoidoscopy shows scattered areas of proctitis within the rectum; the mucosa remains fairly pale in colour but in the areas of inflammation it is oedematous and friable and in one of the author's cases there were ulcers up to a centimetre in diameter.

## TREATMENT

Since the cause is unknown there is no specific cure for proctitis. It is important that the patient be *completely reassured that there is no malignancy* and this can only be done after a sigmoidoscopic examination. At the same time the nature of the condition should be carefully explained to the patient and he *should be warned that his symptoms will persist for a time*. He can be reassured that it will not develop into a malignancy and that the likelihood of a severe ulcerative proctocolitis supervening is small.

Chemotherapy, antibiotics and such treatment have not proved of any value at all in the writer's experience nor have local applications in the form of suppositories or retention enemas. The patient is advised to readjust his mode of living to provide longer periods of rest and is given instructions as to how to maintain his health at a maximum level; by these means natural resistance is increased and the progress of the disease checked.

Over the past twenty-five years emotional disturbances and personality traits have been regarded as important factors in colitis and proctitis (Grace, Wolf and Wolff, 1951). When a disease such as this continues to defy various non-operative measures an explanation is sought in the patient's mental attitude. But any peculiarities in proctitis and proctocolitis appear to be the sequelae of the incessant bleeding and pseudo-diarrhoea rather than the cause. In this disease the patient should be regarded as a normal reacting person; the disease should be explained to the patient who should be reassured that there is no malignancy present and told that the condition will cure itself without causing permanent harm (Hughes, 1956).

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*Chapter Fourteen*

# BENIGN TUMOURS OF THE RECTUM

THERE are two important varieties of benign tumour in the rectum the villous papilloma and the adenoma Other types occur, but are either rare or insignificant

Cuthbert Dukes (1947) made a clear distinction between the papilloma and the adenoma he demonstrated the manner in which the papilloma arose from the surface epithelium and the adenoma from the more deeply situated mucosal glands However although the typical villous papilloma and the typical adenoma have distinctive appearances *it is usual to find features of both in the same tumour*

Willis (1948) pointed out that the structures of these tumours are determined by the size of the field of origin of cell proliferation if the field of origin is limited the tumour will be pedunculated if extensive the tumour will be sessile A villous tumour is the natural result of a process of disordered growth affecting uniformly a comparatively wide but nevertheless strictly defined area of mucosa (Ewing 1950)

## VILLOUS PAPILLOMA

Holmes in 1860 first gave these tumours their name They are usually sessile and cover an area which varies from a centimetre or two in diameter to one larger than the palm of the hand Characteristically the tumour is single but occasionally multiple discrete areas of mucosa are affected The tumour is not often seen in typical form outside the rectum or lower sigmoid colon

### Macroscopic Pathology

The typical villous tumour has a wrinkled folded or convoluted surface and is raised above the surface epithelium flattening out towards the periphery (Figs 181 182) The tumour has almost the same colour as the surrounding mucous membrane and close inspection of the surface shows it to be composed of minute villi usually no more than a few millimetres in length A layer of mucus covers the surface and is responsible for the shiny appearance on endoscopic examination

### Microscopic Pathology

The tumour has a connective tissue framework supporting a single continuous layer of epithelial cells The delicate branching villous structure is only recognised as such when the plane of dissection happens to pass vertically through the central stalk Deep in the supporting connective tissue it is not uncommon to find typical glandular acini of the intestinal type



Fig 181
Villous papilloma of rectum Tumour almost encircled middle third of rectum Abdominal excision and trans anal anastomosis (Mrs C fifty five years)

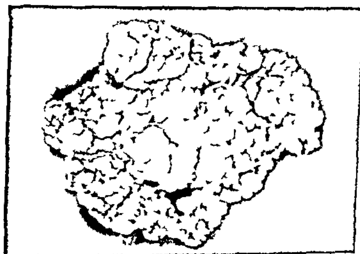


Fig 182
Villous papilloma of rectum Tumour situated in lowest third of rectum Was floated off muscle with adrenalin and saline solution (1 250 000) and excised Two and a half years later no sign of local recurrence (Mrs Y)

**Clinical Features**

The tumour usually develops in later adult life and eighty five per cent are found over the age of forty five years Men and women are equally affected

1 DIARRHOEA —The most characteristic symptom is the frequent passage of mucoid material derived from the mucus secreting cells of the tumour the mucus may be mixed with brown faecal material or it may be quite clear *This profuse discharge of mucus is almost diagnostic of a villous tumour* If the tumour is low in the rectum it may be responsible for the feeling of unsatisfied defaecation

2 RECTAL BLEEDING —The mucus is often tinged with blood but severe bleeding is most unusual

3 PAIN —If the tumour is situated in the upper part of the rectum or in the lower sigmoid colon it may form the apex of an intussusception and may be responsible for severe lower abdominal pain In one such case referred to the writer recurrent episodes of this type of pain were investigated but despite repeated sigmoidoscopic examinations and barium clysmas no cause was found sigmoidoscopy during an attack of pain in the middle of one night revealed the tumour intussuscepting into the rectum

**Physical Examination**

Most of these tumours can be felt with the finger and very few are beyond the reach of the sigmoidoscope The tumour is quite soft and could be missed altogether with careless examination It is slippery and difficult to define and therefore the area involved is hard to estimate it is mobile and superficial It is not friable and if there is any blood on the examining finger it is merely a trace

On inserting the proctoscope and withdrawing the obturator a quantity of mucus may flow out of the rectum The mucus on the surface of the protuberant tumour glistens in the light of the proctoscope or sigmoidoscope The colour of the tumour is that of the surrounding mucous membrane no induration is noted when it is palpated with the end of the sigmoidoscope and it is not particularly friable

**Diagnosis**

The most important differential diagnosis is from malignant disease The villous tumour is benign and can be cured by local excision but treatment of a malignant tumour in such a conservative way nearly always fails

The presence of an area of induration however small must be accepted as a definite indication of malignant change if sigmoidoscopy reveals an ulcerated surface a diagnosis of malignancy can be made with equal certainty A biopsy might be taken from the suspicious area but a negative result will not exclude malignancy

**Treatment**

The tumour should be removed because of the distressing symptoms which it causes and because of the possibility that it may become malignant Simple ablation of the tumour without damage to the anal sphincters should be the surgeon s aim but the manner in which this objective is attained will depend on the circumstances

SMALL TUMOURS IN THE LOWER RECTUM —A small tumour in the lower half of the rectum can be removed through the anus The anal canal is gently dilated the tumour is seized in sponge holding forceps and is withdrawn beyond the anal verge sometimes it is possible to treat tumours as high as the recto-sigmoid junction in the same way but this is not so easy The adjacent mucous membrane is drawn down with the tumour which is excised with a clear rim of normal mucous membrane This is usually done after transfixion and ligation of the pseudo pedicle

LARGE TUMOURS IN THE LOWER RECTUM —This is perhaps one of the most difficult problems the proctologist encounters Undoubtedly the easiest way to effect a permanent cure is to excise the rectum and give the patient a colostomy but this should only be advised as a last resort

In two cases the writer has achieved success by floating the tumour off the muscularis with a solution of adrenalin in normal saline (strength 1 250 000) injected into the submucosa The tumour is then excised and the edges of the resulting mucosal defect are sutured together as far as possible while the tumour is withdrawn towards the anus A regular post-operative check is maintained and if a recurrence should develop it can be treated with diathermy or by further excision

SMALL TUMOURS IN THE UPPER RECTUM —Small tumours in the upper rectum may be withdrawn sufficiently to permit satisfactory removal by ligature and excision but most high tumours cannot be treated in this way and will require removal through an abdominal approach

The abdomen is opened through a lower left paramedian incision The anterior aspect of the upper half of the rectum is incised longitudinally The edges of this incision in the rectum are retracted by means of guy sutures the tumour is grasped and excised and the mucous membrane sutured The incision in the bowel is closed in two layers and the abdomen closed with or without drainage A caecostomy or colostomy is unnecessary

LARGE TUMOURS IN THE UPPER RECTUM —Extensive villous tumours in the upper half of the rectum are best treated by anterior resection and anastomosis (*see* Chap 15) The rectal stump must be carefully inspected before commencing the anastomosis because if excision has been incomplete a further portion will have to be excised If the technical difficulties of an anterior anastomosis are formidable the surgeon should not hesitate to perform an abdomino-anal anastomosis because despite imperfect function it is preferable to a permanent colostomy

## ADENOMA

The term adenoma is given to compact benign tumours composed of glandular tissue they are either sessile or pedunculated and vary from a few

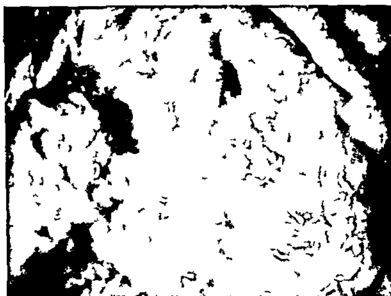


Fig 183
Pale sessile adenomas

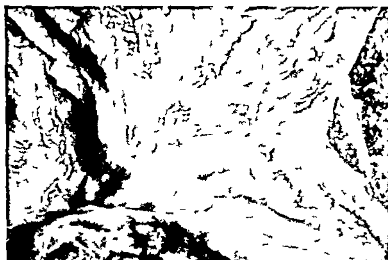


Fig 184
Pale sessile adenomas in neighbourhood of malignant ulcer of rectum

millimetres to five centimetres or more in diameter The tumour appears to be most common in the rectum and lower sigmoid colon but this is probably due to the ease with which it is seen with the sigmoidoscope when low in the

bowel and the difficulty in demonstrating it when at a higher level The tumour may be single or multiple when the whole of the mucous membrane of the large bowel is covered it is referred to as familial intestinal polyposis

## Macroscopic Pathology

*Adenomas are either sessile or pedunculated and either pale or red in colour*

PALE SESSILE ADENOMAS —These tumours are usually about a centimetre or less in diameter They are well defined and have smooth unbroken surfaces projecting just *above the level of the mucous* membrane One or more are nearly always in the neighbourhood of a *carcinoma of the* rectum but they are also com*monly seen in the absence of* malignancy (Figs 183 184)



FIG 185
*Pedunculated pale adenoma Several pale sessile adenomas in region*

PALE PEDUNCULATED ADENOMAS — These tumours are small and irregular and have a comparatively broad stalk Both tumour and stalk have the same colour as the mucous membrane *(except when the latter is pigmented* as in melanosis coli when the tumour remains pale) and convey the impression that they are the result of some early *inconsequential* growth deformity (Fig 185)

RED SESSILE ADENOMAS — *These tumours may be of any* size they are attached to the mucous membrane by a broad base and project a variable distance into the lumen of the bowel (Figs 186 187) They possess a red and friable surface which may be smooth or rough close inspection may show a velvety surface *caused by villous processes*

RED PEDUNCULATED ADENOMAS —These tumours may reach quite an appreciable size They are similar in appearance to the sessile variety but are suspended *from the mucosa* by a strap-like pedicle this is usually long and allows the tumour to lie freely in the lumen of the bowel (Fig 188)



FIG 186
Red sessile adenoma of recto sigmoid junction Segmental resection and primary anastomosis



FIG 187
Benign adenoma close to large carcinoma of recto sigmoid junction Palliative resection and primary anastomosis

### Microscopic Pathology

On microscopic examination the tumours will be found to possess a delicate stroma supporting groups of cells arranged in regular fashion around acini The pale varieties have a solid and relatively avascular stroma with little glandular tissue the red adenomas have a finer and much more vascular stroma and the cell groups are more abundant (Fig 189 A B)



FIG 188
Pedunculated red adenoma of recto sigmoid junction Segmental resection and primary anastomosis

### Clinical Features

Adenomatous polyps are seen in the first decade of life and then uncommonly until later in adult life In most instances they cause no symptoms and are discovered in the course of routine ano-rectal examinations

BLEEDING —The commonest symptom is bleeding this is usually small in quantity and the blood smears the surface of the motion

PROLAPSE —Pedunculated adenomas in the lower part of the rectum may prolapse through the anus during defaecation and cause discomfort the prolapsed tumour may return spontaneously but sometimes has to be replaced by the patient

**Physical Examination**

Tumours situated in the lower rectum are usually palpable The pale



A



B

Fig 189

A—Pale adenoma Stroma dense and glandular formation scattered
B—Red adenoma Delicate vascular stroma supports a regular arrangement of cells

sessile adenoma is firm and feels like a gritty nodule whilst the pale pedunculated adenoma is difficult to feel the red sessile tumour is soft relatively

mobile and hard to define whilst the pedunculated red adenoma is extremely mobile and elusive although soft smooth surface can usually be appreciated

Endoscopic examination will enable a diagnosis to be made It is most useful in visualising those tumours in the upper part of the rectum out of reach of the finger As the instrument is passed up the rectum streaks of blood and mucus can often be seen on the surface of the otherwise normal mucosa and this will provide a valuable clue as to the presence of a tumour at a higher level Sometimes it is not possible to visualise the tumour but if the examination is repeated a day or two later it may be obvious Pedunculated red adenomas in the upper rectum appear to lie freely in the lumen and identification of the paler pedicle strap may be impossible such tumours can be moved about very easily with the tip of the sigmoidoscope

## Diagnosis

The presence of an adenoma is easily established by endoscopic examination but two errors may be made in the diagnosis

An adenoma may be seen and might be regarded as the cause of the patient s symptoms when in actual fact there may be a carcinoma at a higher level When the rectum is laid open post-operatively after removing it for malignant disease it is common to find an adenoma in close proximity to the neoplasm (Fig 187)

A malignant adenoma might be regarded as a benign tumour and treated inadequately by a purely local removal as a result there may be an avoidable delay in the recognition and adoption of more appropriate radical treatment If all red adenomas are viewed with suspicion especially when sessile mistakes of this nature should be less common (Chap 15)

## Treatment

Pale adenomas whether sessile or pedunculated seem innocuous although they are commonly seen as satellites in the neighbourhood of a carcinoma Their presence should intensify the clinician s search for malignancy but apart from this these tumours can be ignored although it would be advisable to suggest an annual examination henceforth

## Sessile Red Adenomas

These tumours should be treated by excision including a generous portion of the surrounding tissue because of the difficulty in deciding whether or not these tumours are benign or malignant If the tumour is small and fairly low in the rectum it can usually be withdrawn and the pseudo-pedicle so formed transfixed and ligated If the tumour is small but too high to be so treated it should be seized by the long sigmoidoscope forceps and twisted off and the stump of the pedicle gently diathermied

Large sessile adenomas should be treated by a more radical removal which should include the regional lymph field although these tumours might

be found benign even with repeated biopsy examinations the writer regards them with suspicion If the tumour encroaches on the anal sphincter region combined excision of the rectum with permanent colostomy should be advised but in most cases it is possible to perform an anterior resection and end to-end anastomosis or an abdomino anal anastomosis with preservation of the anal sphincter

**Pedunculated Red Adenomas**

These tumours should be excised by division of the strap like pedicle after ligature In most instances endoscopic removal is possible Pedunculated tumours low in the rectum can be brought outside the anus and here transfixed ligated and excised Small tumours at a higher level can be twisted off and the pedicle touched with the diathermy in order to reduce the amount of bleeding Large pedunculated tumours in the upper rectum will be best treated by a trans abdominal approach the rectum is opened by an anterior longitudinal incision and the adenoma excised after which the incision in the rectum is closed in two layers

**Diathermy in the Treatment of Papillomas and Adenomas of the Rectum**

Some surgeons favour destruction of the tumour with diathermy Sessile tumours are removed piecemeal whilst pedunculated tumours can often be completely removed by severing the pedicle with the diathermy Frankfeldt of New York is a leading exponent of this method but is selective in his choice of cases and for the large tumours advocates surgical excision (Frankfeldt 1952) A diathermy excision may later prove to be incomplete haemorrhage primary and secondary and perforation are important complications Instances of explosion complicating diathermy within the rectum have been reported (Galley 1955) In one such case the surgeon had placed two cotton wool tampons into the rectum above the level for the diathermy an electrode was passed down the proctoscope to the mucous membrane and as the foot switch was closed there was a loud report and an explosion which wrested the procto scope from the surgeon s hand and ejected the tampons with considerable force Fortunately for the surgeon the deflection of the proctoscope pre vented him from receiving the full force of the ejected tampons and they hurtled past him and hit the wall behind him The patient was shocked and complained of abdominal pain the abdomen was explored but apart from bruising of the walls of the sigmoid colon no perforation had taken place and the patient recovered (Moutier 1946) Complications of this nature can be prevented by introducing a steady stream of some inert gas such as nitrogen or carbon dioxide by means of a fine catheter passed to the end of the instrument

## FAMILIAL INTESTINAL POLYPOSIS

Familial intestinal polyposis is a hereditary disease characterised by the development within the colon and rectum of large numbers of sessile and

mobile and hard to define whilst the pedunculated red adenoma is extremely mobile and elusive although soft smooth surface can usually be appreciated

Endoscopic examination will enable a diagnosis to be made It is most useful in visualising those tumours in the upper part of the rectum out of reach of the finger As the instrument is passed up the rectum streaks of blood and mucus can often be seen on the surface of the otherwise normal mucosa and this will provide a valuable clue as to the presence of a tumour at a higher level Sometimes it is not possible to visualise the tumour but if the examination is repeated a day or two later it may be obvious Pedunculated red adenomas in the upper rectum appear to lie freely in the lumen and identification of the paler pedicle strap may be impossible such tumours can be moved about very easily with the tip of the sigmoidoscope

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## FAMILIAL INTESTINAL POLYPOSIS

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pedunculated adenomatous tumours caused by an excessive proliferation of the glandular epithelium in the mucous membrane of the colon and rectum It is a rare condition which does not usually manifest itself until later childhood or early adult life

The disease appears to be inherited as a Mendelian dominant In twenty two of thirty three families in which the condition occurred and which were investigated at St Mark s Hospital more than one member of the family were affected Analysis of this group of twenty two families showed that the sexes were equally affected and that either transmitted the disease that in most polyposis families only half the children were likely to inherit the abnormality the remainder being normal that usually only those who inherited the polyposis transmitted it to the next generation The severity of the disease and the liability to cancer of the rectum or colon varied considerably in different families In families in which the polyposis developed early in life cancer frequently followed within ten to fifteen years whereas in families in which polyposis occurred later the precancerous incubation period was longer so that patients might die from natural causes before intestinal cancer had time to develop (Cuthbert Dukes 1952)

In the remaining eleven families only one member was affected Although such cases have been regarded as different from the typical familial examples Dukes could not find any difference in size number and distribution of the tumours nor any difference in the age of onset symptoms or course of the disease Solitary cases of polyposis also tend to develop carcinoma after the same period of fifteen years The average age of death from carcinoma proved to be the same for both solitary and familial cases Dukes suggested that further observation might show that these cases are the first manifestation of a gene mutation and although these patients have not inherited the disease they may eventually transmit it to their offspring

## Surgical Pathology

The mucosa of the colon and the rectum is diffusely studded with polyps of all sizes some are sessile and others pedunculated The mucosa between the tumours appears normal

The tumours are at first non malignant and most of them remain so but after an interval of a few months or years carcinoma develops in one or more of these adenomas the onset of malignancy being indicated by increase in size darker colour firmer consistency and later frank ulceration

## Clinical Features

The patient complains of diarrhoea with the passage of blood and mucus the amount of blood which is lost is inconsiderable unless an ulcerating carcinoma has supervened

Digital examination of the rectum discloses the numerous small polyps although if the examiner is hasty they may easily be overlooked Sigmoidos

scopy permits visualisation of the tumours and barium clysma examination will confirm the diffuse nature of the disease

**Differential Diagnosis**

It is not uncommon to find four or five pedunculated and sessile adenomas in the rectum but they are separated from one another by an appreciable distance These cases should not be classified as familial intestinal polyposis where the tumours are present in very large numbers

In ulcerative colitis pseudo polyps appear on the mucosa and closely simulate familial polyposis In these cases the symptoms are severe and the patient often seriously ill The intervening mucous membrane is inflamed and friable Barium clysma examination may show relatively little disturb ance in the caecum and ascending colon but in the left half of the colon there is lack of haustration and filling irregularities caused by ulceration of the intervening oedematous mucous membrane

### TREATMENT

The danger of carcinoma supervening on this disease is so great that the bowel should be removed The experience gained at St Mark s Hospital indicates that active surgical treatment certainly prolongs life One of two procedures is performed

**Abdomino Perineal Excision of the Rectum, Total Colectomy and Permanent Ileostomy**

This is the more radical procedure and is followed by permanent relief from the possibility of carcinoma developing The operation is done in one two or three stages but the writer prefers a one stage primary procto-colectomy

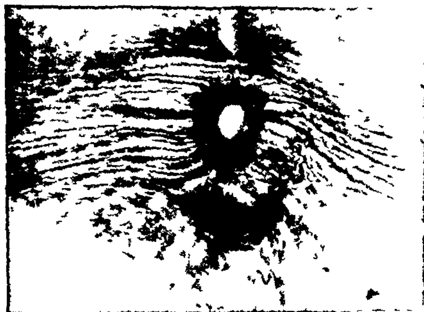
**Colectomy and Ileo Rectal Anastomosis, after Clearing the Rectum of Polyps by Previous Diathermy**

The rectum is first cleared of polyps by endoscopic diathermy this requires repeated visits to the theatre but it is not necessary for the patient to stay in hospital during the whole of this period When the surgeon is satisfied that the rectal mucosa is free of polyps he can proceed to colectomy and anastomosis of the ileum to the upper third of the rectum The patient will subsequently require regular re-examination of the rectal stump so that new polyps may be detected and diathermied and any tendency towards neoplastic changes diagnosed at the earliest stage of development

## FIBROUS POLYP OF THE ANAL CANAL

Pedunculated fibrous tumours are not uncommon in the anal canal These tumours appear to be excessively enlarged anal papillae which have gradually developed a stalk probably as a result of efforts to extrude them at defaecation

They are usually rounded or oval in shape with a diameter which varies from one to three centimetres they are attached to the mid portion of the



A



B

FIG 190

A Fibrous polyp of anal canal removed by excision after ligation of pedicle

B Microscopic examination reveals chiefly fibrous tissue

anal canal by a thick vascular stalk The tumours have a yellowish white colour and possess a thick coarse outer covering they are pale and relatively

avascular on section (Fig 190 A) Microscopic examination shows them to be composed chiefly of fibrous tissue (Fig 190 B)

The chief symptoms are firstly the presence of a lump and secondly painful and uncomfortable defaecation Bleeding may be observed by the patient but this comes not from the polyp but from the anal canal mucous membrane which is dragged down by the prolapsing polyp The polyp can be palpated easily and can be seen with the proctoscope

If the polyp causes discomfort it can usually be removed under local anaesthesia and without the need for the patient to enter hospital The polyp is first withdrawn through the anus and a few drops of a local anaesthetic injected into the pedicle After a few minutes have elapsed the polyp may be grasped with a pair of forceps and withdrawn sufficiently to permit a ligature to be tied around the pedicle and the polyp removed Post-operatively the patient should be warned that he will experience discomfort when the effects of the local anaesthetic have worn off and also that some bleeding is *not uncommon about a week or ten days afterwards*

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*Chapter Fifteen*

# CARCINOMA OF THE RECTUM

CARCINOMA of the rectum has been recognised by physicians since the very earliest times Galen (A D 138) wrote Scirrhous is a hard heavy immobile and painful tumour carcinoma is a very hard malignant tumour with or without ulceration *Its name comes from the animal called the crab*

John Arderne gave an excellent description of the disease in the fourteenth century and was unable to recall any case which survived for more than a relatively short time after diagnosis had been made

Although sporadic attempts were made to treat the disease by local extirpation it was not until late in the nineteenth century that the surgical treatment of carcinoma of the rectum became definitely established and has now *improved to such an extent that the rectum is recognised as one of the* more favourable organs for cancer from the point of view of prognosis

The rectum is one of the common sites in which carcinoma develops (Fig 191) Only breast stomach lung colon and uterine cervix are more frequently involved The rectum and sigmoid colon together account for about three-quarters of the tumours occurring in the large bowel (Fig 192) Carcinoma notifications reveal that approximately one hundred new cases of carcinoma of the rectum are registered each year from six public hospitals in Melbourne In about four per cent of instances carcinoma of the rectum *is associated with a second neoplasm elsewhere in the* large bowel (Table XI)

TABLE XI

INCIDENCE OF TUMOURS OF THE LARGE BOWEL ASSOCIATED WITH CARCINOMA OF THE RECTUM AND ANAL CANAL IN 227 CASES

| *9 cases* | 4% |
|---|---|
| Carcinoma of the rectum associated with carcinoma of the caecum | 2 |
| Carcinoma of the rectum associated with carcinoma of sigmoid or rectosigmoid | 7 |

## *AETIOLOGY OF CARCINOMA OF THE RECTUM*

### Rectal Polyp

Whether or not a benign *rectal polyp can* become malignant is uncertain It is impossible to decide whether a polyp is benign or malignant on macroscopic *examination* A *polyp* might be regarded as benign and no treatment advised the subsequent replacement of the polyp by a typical malignant neoplasm might be considered as evidence of malignant transformation in the previously benign tumour when in actual fact it represents *merely an enlarge*ment of a pre-existing focus With this qualification a rectal polyp might be regarded as *a pre malignant lesion* (Fig 254)

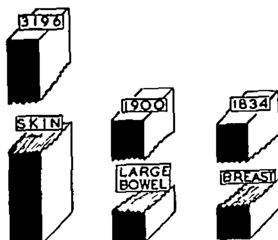



FIG 191
Cancer notifications Melbourne 1940/41—1946 51

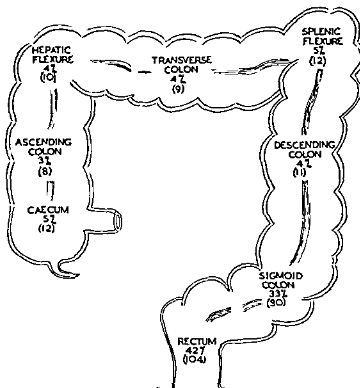



FIG 192
Incidence of carcinoma of large bowel and rectum in a consecutive series of cases treated at the Royal Melbourne Hospital

## Familial Intestinal Polyposis

This is an important pre-disposing condition Carcinoma develops about ten or fifteen years after the first onset of symptoms The average age of patients with carcinoma of the rectum associated with polyposis operated on at St Mark s Hospital was thirty two years as compared with fifty seven years for those without polyposis (Fig 193)



FIG 193

Carcinoma of rectum complicating multiple polyposis (Mr S thirty four years Twelve days abdominal pain Examination revealed carcinoma in upper third of rectum and multiple polyposis Ileostomy performed on 6th April 1950 combined excision of rectum on 18th May 1950 Alive and well after five and a half years)

## Chronic Ulcerative Colitis

This disease is now accepted by nearly all authorities as an important predisposing condition and the risk of cancer of the colon and rectum is greater in ulcerative colitis than in the normal bowel (MacDougall 1954 Cuthbert Dukes 1954) Zetzel (1954) after reviewing current opinions observed that cancer developed in three per cent of all patients with colitis in eleven per cent of those treated surgically and in twenty per cent of those with colitis of greater than twenty years duration There is no way of predicting which patient will develop carcinoma and even those with mild disease are more prone to carcinoma than those with normal bowels (Wheelock and Warren 1955) Following an analysis of 1,500 cases Bargen and his associates at the Mayo Clinic (Bargen *et al* 1954) concluded that carcinoma of the large bowel is twenty to thirty times more common as a cause of death in this disease than in the population as a whole (Fig 194)

## PATHOLOGY OF CARCINOMA OF THE RECTUM

### Macroscopic Pathology of Carcinoma of the Rectum

Cuthbert Dukes (1949) distinguishes six varieties of intestinal carcinoma and his classification applies to those found in the rectum

1 MALIGNANT ADENOMA —This refers to a carcinoma in a pre-existing adenoma The adenoma may be sessile or pedunculated when it is suspended by a strap-like attachment Typically a malig nant adenoma has a darker colour than the benign and is indurated and ulcerated

2 MALIGNANT PAPILLOMA —Villous papillomas have a characteristic convol uted surface and they are composed of masses of delicate villi which give the tumour a velvety appearance When malignant changes supervene the greater part of the tumour remains benign whilst the affected portion becomes irregular and ulcerated and the villi short and rigid

3 PROTUBERANT CARCINOMA —This tumour differs from the malignant papil loma in that it is malignant throughout It projects into the bowel and although it may be large there is often little invasion through the wall of the rectum (Figs 195 196)

4 ULCERATING CARCINOMA —This is the most common variety the tumour may be quite small and yet show distant metastases As the tumour increases in size it spreads around the bowel in a circumferential manner (Fig 197)

5 STENOSING CARCINOMA —This type of tumour is more frequently seen in the recto sigmoid region than lower in the rectum The tumour is relatively small



FIG 194
Multiple carcinomas in rectum super vening on ulcerative colitis (Mr D fifty seven years Ileostomy performed for ulcerative colitis of thirteen years duration Colon not removed and eight years later developed mass alongside anus On 8th March 1955 combined excision of rectum performed Two other primary tumours noted in speci men Remained well for twelve months Died few days after sudden onset of ascites)



FIG 195 FIG 196

FIG 195—Small protuberant carcinoma of rectum (Mr B B, sixty-eight years Two weeks prior to consultation passed quantity of blood with a motion Combined excision of rectum performed on 6th April 1954 Died of congestive cardiac failure on 13th December 1954 There was no sign of recurrence Tumour is a protuberant carcinoma of low grade histological activity and without glandular spread)

FIG 196—Large protuberant carcinoma in middle third of the rectum (Mrs W sixty two years Twelve months blood in motions Combined excision of rectum on 28th May 1953 Three years later no sign of recurrence)



Fig 197

Fig 198

Fig 197—Ulcerating carcinoma lower third of rectum (Mr B., sixty two years Eight months unsatisfied defaecation and blood in motions At operation on 8th November 1954 massive glandular deposits and extensive involvement of liver found Gained three stones in weight over next twelve months *sixteen months after operation still in excellent health*)

Fig 198—*Stenosing* carcinoma (Mrs C seventy years Increasing constipation of one month's duration Combined excision of rectum performed on 6th May 1954 Eighteen months later well without sign of recurrence)

and dense and fibrous in structure and is responsible for a very tight stricture (Fig 198)

6 ATYPICAL CARCINOMA —Tumours which do not comply with the above characteristics may be classified as atypical

**Prognostic Significance of Macroscopic Appearance**

Protuberant tumours are usually of low grade malignancy in contrast to the much more active deeply ulcerating tumours

Cuthbert Dukes (1949) observed that many of the very large neoplasms extended widely over the surface of the bowel but possessed little tendency to invade In a consecutive series of 1 500 cases of rectal cancer he found thirty in which the primary tumour was more than four inches in diameter the incidence of lymphatic metastases in these was ten per cent less than that found with average size tumours At the other extreme he noted that very small tumours often proved to be highly malignant and were found to give rise to widespread metastases The records from St Mark s Hospital show that lymphatic metastases are more common in tumours less than an inch in diameter

**Microscopic Pathology of Carcinoma of the Rectum**

Cuthbert Dukes has divided rectal carcinoma into three main histological groups

1 ADENOCARCINOMA —The tumour is composed of columnar or cuboidal cells arranged for the most part in a tubular or acinar pattern surrounding glandular spaces which may be irregular in shape and either empty or partly filled with cellular debris There is no sign of mucus It is the most common histological variety and may be divided further into low average and high grades of malignancy according to the degree of anaplasia present (Fig 199)

2 COLLOID CARCINOMA —This has a similar structure to the adenocarcinoma but differs in that mucus is present If stored in individual cells the mucus gives a signet ring appearance but if secreted into the tissue spaces the cells are found in groups within the mucus (Fig 200)

3 CARCINOMA SIMPLEX —This term describes an anaplastic type of carcinoma composed of polygonal and spheroidal cells without glandular disposition or evidence of mucus secretion The cells might be scattered singly or in clusters or arranged in solid trabecular or alveolar pattern There is a special tendency towards metaplasia

**Prognostic Significance of Microscopic Appearance**

The adenocarcinoma is easily the most common histological type of tumour found Cuthbert Dukes has found that about eighty per cent of the high grade and twenty per cent of the low grade malignant tumours have gland metastases and that about thirty per cent of patients with high grade malignancies and sixty per cent of those with low grade malignancies are alive

five years later Broders (*1920*) also showed the *importance of the microscopic* appearances in estimating the prognosis and his classification has been widely used the tumour is classified as Grade I when 100 to seventy five per cent



A



B

Fig 199
A—Adenocarcinoma of rectum Well differentiated tumour
B—Adenocarcinoma of rectum Poorly differentiated tumour

of the tumour shows histological differentiation Grade II with seventy five *to fifty per cent differentiation* Grade *III* with fifty to twenty five per cent differentiation and Grade IV with twenty five to nil per cent differentiation



A



B

Fig. 200

Carcinoma of rectum

A—Colloid or mucoid carcinoma

B—Adenocarcinoma with areas of colloid formation

Patients with tumours showing Grade I differentiation have an excellent prognosis whilst those with Grade IV tumours rarely survive long

*When the tumour has a colloid microscopic* appearance the prognosis is uncertain whilst tumours which belong to the carcinoma simplex group are of a high grade of malignancy

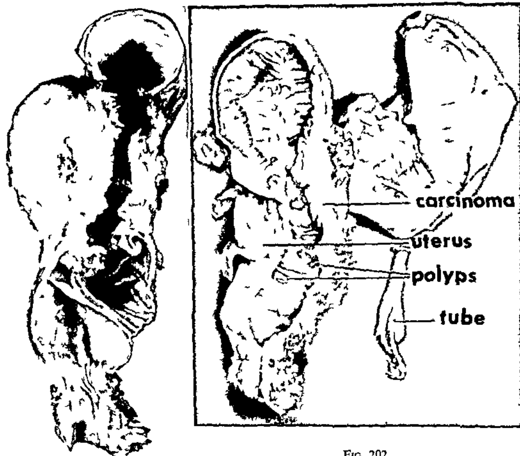



Fig 201 Fig 202

Fig 201—Carcinoma of rectum invading uterus (Mrs McM sixty two years Carcinoma *of rectum with local invasion of body of uterus Combined excision of rectum and hysterectomy* performed on 5th April 1950 Convalescence uneventful but died of peritoneal secondaries on 8th January 1951 )

Fig 202—Carcinoma of rectum involving sigmoid colon and uterus Numerous polyps above and below tumour (Mrs P thirty two years Four months duration of symptoms Abdomino perineal excision of rectum and hysterectomy on 28th May 1954 Died March 1955 from peritoneal secondaries )

**Local Invasion by Carcinoma of the Rectum**

The tumour spreads through all coats of the bowel into extrarectal tissues Intramural spread from the tumour is rarely a feature of carcinoma of the rectum and occurs almost exclusively in annular tumours of high grade malignancy with node metastases and vein invasion (Grinnell 1954) The effect of

spread to the extrarectal tissues will vary according to the site of invasion Adherence of the tumour area to a neighbouring viscus or structure does not necessarily indicate malignant invasion and although published figures vary it seems that actual invasion is present in less than fifty per cent of such cases (Knight Waugh and Dockerty 1952) In the female involvement of the vagina and uterus (Figs 201 202) is relatively uncommon despite the proximity of the tumour and similarly it is very unusual to find invasion of the prostate seminal vesicles and bladder in the male Occasionally the primary tumour involves one or both ureters and sometimes a loop of small intestine is adherent to the peritoneal aspect of a tumour in the upper half of the rectum

**Prognostic Significance of Local Invasion by Carcinoma of the Rectum**

In about fifteen per cent of cases the tumour will not have completely invaded the full thickness of the bowel wall the prognosis after resection of such a tumour is excellent About eighty to ninety per cent of patients with this type of tumour are alive and well five years later Cuthbert Dukes labelled such cases A cases In thirty five per cent of tumours he found that all coats of the rectum had been invaded but no lymphatic metastases were found about sixty to seventy per cent of patients with such tumours were alive five years later In Cuthbert Dukes classification these are B cases

Knight Waugh and Dockerty (1952) have made a special study of the prognostic effect of vaginal invasion in the female and it is probable that the conclusions derived from the study are more or less applicable to invasion of other neighbouring organs They found that mere proximity of the tumour to the vagina did not affect the prognosis If the vaginal involvement is purely inflammatory the prognosis is a little better than if malignant invasion is present When there is gross invol[illegible] vaginal wall the survival rate is less than half that found when such i[illegible]ent

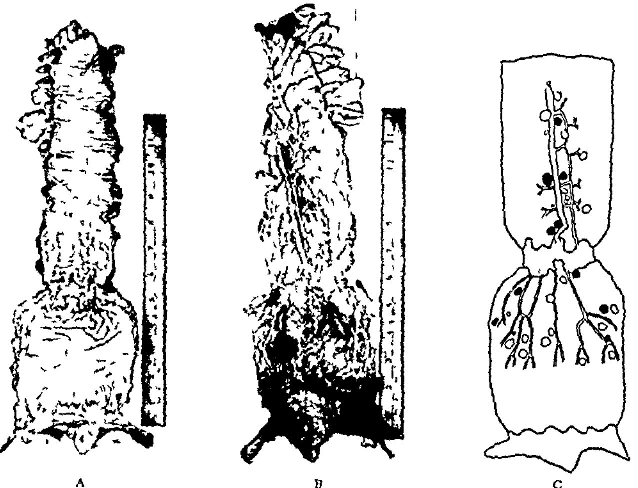



FIG 203

Retrograde lymphatic involvement (Mrs T fifty six years Unsatisfied defaecation for four weeks Combined excision of rectum on 24th April 1952 Died on 19th September 1954 with extensive perineal recurrence)

fibrous coat of the rectum These para rectal nodes (or Gerota s nodes) number between four and seven and are practically always the first involved by tumours in the lower part of the rectum

The glands along the main trunk of the superior haemorrhoidal vessels are usually involved next *and in sequence from below upwards so that in* a typical specimen of advanced carcinoma of the rectum lymphatic metastasis may extend *in a chain from the para rectal glands to the site of the ligature on* the pedicle Occasionally a case is met with in which glandular metastases *are situated in one of the upper glands without apparent involvement of the* lower ones this is almost certainly due to the presence of abnormally long *lymphatic pathways which by pass the glands nearer the tumour* It is very exceptional to find downward lymphatic spread from a carcinoma in the upper *half of the rectum* (Fig 203)

Lymphatic metastases along the superior haemorrhoidal vessels may reach *a considerable size* and become attached to the pelvic fascia or peritoneum

2 Middle Haemorrhoidal Glands —Glands are to be found in association with the middle haemorrhoidal vessels these are distinct from the para rectal nodes because they are not deep to the fibrous coat of the rectum and therefore tend to *lie in the plane of dissection* when the rectum is excised Efferent vessels from these nodes proceed to glands along the internal iliac vessels (Figs 21 22)

If the tumour lies within the field of the middle haemorrhoidal vessels that is to say from four to eight centimetres from the anus these glands may be involved primarily as has been demonstrated by Freidin (1955) He dissected forty-eight tumours in this region and in two found affected glands in the middle haemorrhoidal group although the superior haemorrhoidal lymphatic chain was clear In five others he noted metastases in the middle haemorrhoidal group with minimal involvement of the superior haemorrhoidal group He dissected thirteen specimens in which the tumour lay within four centimetres of the anus and in two cases (both squamous cell carcinomas) the middle haemorrhoidal glands were affected and in one of these the superior haemorrhoidal chain was free of metastatic deposits Freidin dissected thirty nine specimens in which the tumour was situated above the middle haemorrhoidal vessel field (above eight centimetres from the anus) but he was unable to find any glands affected

3 *Inguinal Glands —The inguinal* glands are rarely affected in carcinoma of the rectum although very occasionally a large secondary gland is to *be found just below the inguinal ligament* If the primary tumour invades the anal canal the inguinal glands are more likely to be affected but even then *it is uncommon*

**Prognostic Significance of Lymphatic Spread**

The influence of lymphatic spread on the prognosis *is shown in the five* year survival rate at St Mark s Hospital Of cases with lymphatic metastases

26 2 per cent survived five years in comparison with sixty-eight per cent of patients without metastases (Dukes 1949)

Not only is the actual presence of affected nodes important but also the extent of the involvement As far as the superior haemorrhoidal group of glands is concerned when metastases are confined to the immediate neighbourhood of the tumour the outlook is fairly good These cases have been classified as C 1 cases in contrast to the C 2 cases where the glands extend to the point of ligature and in which the prognosis is not good (Dukes 1949)

**Venous Spread in Carcinoma of the Rectum**

Venous invasion can be detected in ten to fifteen per cent of cases by macroscopic dissection (Dukes 1949) but if more complicated procedures such as the radiographic technique described by Barringer Dockerty Waugh and Bargen (1954) be employed the incidence of detectable venous invasion rises and is said to be nearer forty per cent

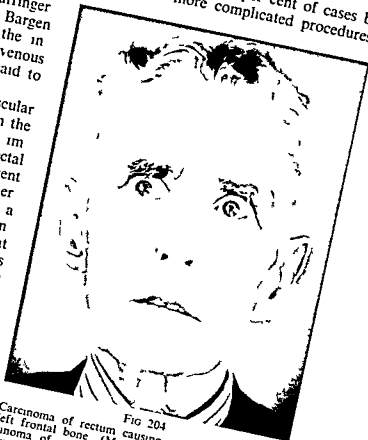


Fig 204

Carcinoma of rectum causing secondary deposits in left frontal bone (Mr McS sixty five years Carcinoma of rectum with advanced local spread and numerous secondary deposits in liver Palliative excision of rectum performed on 19th January 1954 Developed secondary deposit in left frontal bone and died eleven months after operation )

It appears that vascular invasion originates within the intestinal wall or in the immediately adjacent peri rectal tissues and may be present with a tumour which otherwise would seem to have a favourable prognosis Sunderland (1949) showed that almost half of the tumours within six centimetres of the anus had microscopic evidence of venous invasion whilst less than a quarter of those in the upper half of the rectum showed such involvement Intravascular spread is found most often in anaplastic tumours (thirty per cent of high grade malignancy tumours) but rarely in those of low grade histological activity (three per cent)

The most common site for blood borne metastasis is the liver the lungs are second and the adrenals bone thyroid kidney intestine spleen and pancreas follow in that order (Fig 204)

**Prognostic Significance of Venous Spread**

The presence of tumour cells within the lumen of the vein would seem to be of grave significance but Cuthbert Dukes has found that it is not as serious as might be expected although naturally the possibility of visceral metastases is greater Extension to the liver occurs in only half of those with venous invasion whilst hepatic metastases have been found when examination of the specimen has failed to reveal any such vascular involvement

Sunderland (1949) concluded that the survival rate of patients with positive lymph nodes was much better when no venous invasion was present



FIG 205

Carcinoma of upper third of rectum with peritoneal secondary deposits Palliative anterior excision of rectum and primary anastomosis (Mrs S seventy eight years Four months history of blood in motions Resection and anterior anastomosis on 2nd June 1954 Died February 1955)

Metastases in the liver are quite compatible with prolonged survival in good health Abel (1950) recently quoted a small series of cases in which resection was performed in the presence of secondary deposits in the liver and in which there was survival for periods up to eight years

**Invasion of Peritoneum by Carcinoma of the Rectum**

Carcinoma of the upper half of the rectum may invade the peritoneal coat immediately it has penetrated the muscular layers In advanced cases a similar peritoneal invasion from secondary deposits in the superior haemorrhoidal lymph glands may be observed When the tumour involves the peritoneal coat there is a distinct likelihood of widespread peritoneal metastases appearing Peritoneal metastases may be found before any evidence of hepatic metastases but seem rare in the absence of lymphatic involvement

Macroscopic peritoneal metastases vary in appearance from tiny colourless excrescences in the neighbourhood of the primary tumour in the pelvis to hard white infiltrating plaques of variable size and scattered at random in the peritoneal cavity (Fig 205)

Occasionally secondary spread is responsible for an ovarian tumour which may actually be of such size as to be responsible for the patient seeking

treatment These secondary tumours may represent blood borne metastases but as visible peritoneal secondary deposits are nearly always to be found in the neighbourhood it seems more likely that they originate in the same way as do the peritoneal secondary deposits (Fig 206)

**Prognostic Significance of Peritoneal Invasion**

Invasion of the peritoneal surface with macroscopic peritoneal secondary deposits remote from the primary tumour renders the outlook hopeless and within a few months at the most ascites develops and the peritoneal tumours develop into larger masses and cause intestinal obstruction



Fig 206

Secondary deposit right ovary which appeared fifteen months after resection of a carcinoma of rectum with glandular spread

## CLINICAL FEATURES OF CARCINOMA OF THE RECTUM

**Sex**

Carcinoma of the rectum affects the male sex more commonly than the female In the writer s series of 242 cases 139 were men (57 4 per cent) and 103 women (42 6 per cent)

**Age**

The youngest patient in the writer s series was a boy of twenty one years and the oldest a woman of eighty six The majority of cases are to be found in the sixth and seventh decades of life (Fig 207) De Peyster and Gilchrist (1955) found fifty three cases of large bowel carcinoma in children reported in the literature

## Mode of Presentation of Carcinoma of the Rectum

1 CARCINOMA OF THE RECTUM WITH TYPICAL SYMPTOMS OF SHORT DURATION —Most patients present with *one or more symptoms typically* associated with carcinoma of the rectum such as bleeding with the motions unsatisfied defaecation and altered bowel habit The discovery of a tumour does *not occasion surprise*

The most common symptom is *bleeding* The amount of blood lost is small and is usually mingled with or is on the surface of the motions When flatus is passed small quantities of blood *mucus and faecal* material tend to escape involuntarily Severe haemorrhage is unusual

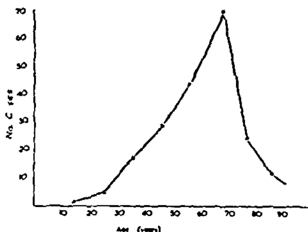



Fig 207
Age incidence of carcinoma of rectum
[illegible]

*With tumours* of the lower half of the rectum *unsatisfied defaecation* is almost invariably present So persistent does it become *that some patients* perform their own digital examination of the rectum and may feel *the mass themselves*

Tumours of the rectosigmoid region and of the upper third of the rectum are responsible for *increasing constipation* although the patient usually makes frequent but comparatively unsuccessful attempts to pass a motion If the lesion is an obstructing tumour huge quantities of inspissated faecal material may collect in the *colon above and there is often a severe hypochromic anaemia despite the* absence of any excess blood loss or of secondary deposits (Fig 261) Tumours in the lower half of the rectum may be associated with normal motions but *the bowels are opened many times each day* because of the sensation of unsatisfied defaecation and because of the fear of soiling underwear if flatus is passed

*Pain* is not a feature of carcinoma of the rectum in *the early stages* but in advanced cases it is practically impossible to relieve Some are aware of a dull discomfort in the rectum and an occasional patient has severe pain which is relieved with removal of the rectum One patient treated by *the writer* complained of pain radiating down the inner aspect of the leg from the region of the left ischial tuberosity there was a very large fixed tumour in the lower third of the rectum Removal of the tumour was *followed by complete relief* of pain and there was still *no sign* of recurrence eighteen months later Abdominal pain may complicate an obstructing tumour in the upper half of the rectum

*Digital examination* within the anal canal will disclose practically all carcinomas of the rectum although a tumour in the upper third of the rectum

of an obese individual may be hard to feel By pressure on the perineum it is possible to reach tumours ten to eleven centimetres from the anus Characteristically a carcinoma feels hard shapeless and is friable and the edge is usually raised and everted The tumour extends a variable distance around the lumen of the rectum After a preliminary examination the clinician may suspect that the tumour is completely annular but subsequent more careful palpation usually reveals that one segment has not been involved Protuberant tumours of lower grade malignancy may not feel hard but they still possess an induration lacking in benign tumours and different from that presented by inflammatory masses The tumour may be freely mobile or may seem fixed

*Proctoscopy* enables tumours in the lowest part of the rectum to be visualised and will reveal blood stained faecal material in the lumen if the tumour is at a higher level

*Sigmoidoscopy* permits inspection of tumours in the upper portion of the rectum *this proves of great value in those tumours in which only the* lower border can be felt A tumour does not look as large as it feels an ulcer has no typical shape but its edges are usually raised and the floor is necrotic friable and haemorrhagic A tumour feels very hard when it is touched with the end of the sigmoidoscope

*Biopsy* of a tumour can usually be done without difficulty The tumour is visualised through the proctoscope or sigmoidoscope and a piece removed from the edge with cutting forceps Severe haemorrhage and perforation of the rectum are very rare complications of biopsy (Gabriel Dukes and Bussey 1951) and there is no evidence to show that biopsy favours dissemination of the tumour Biopsy examination will give positive confirmation of the diagnosis

*Radiological examination* in the form of a barium clysma is not uncommonly conducted However it is not only of no assistance but may be fallacious The diagnosis of carcinoma of the rectum can always be made without it

2 CARCINOMA OF THE RECTUM DISCOVERED UNEXPECTEDLY IN THE COURSE OF ANO-RECTAL EXAMINATION —Most patients presenting with ano rectal disorders have a history typical of some benign condition For example the patient may seek treatment for prolapsing third degree haemorrhoids of several years duration or for a perianal haematoma which has been present for a day or two There may be nothing in the history to suggest the presence of a carcinoma and when subsequent digital and endoscopic examination discloses a tumour the clinician is surprised

*Patients with ano rectal symptoms should always be given a methodical examination not only because a tumour may be discovered but also because the patient wishes a complete reassurance in the event of negative findings* For example on finding a perianal haematoma the clinician out of respect for the patient s comfort may omit digital and endoscopic examination because

the cause of the patient's symptoms is apparent on inspection but this may prove a disastrous concession

3 Carcinoma of the Rectum Causing Large Bowel Obstruction — Malignant tumours in the capacious lower rectum rarely cause obstruction but those situated in the upper part of the rectum and at the rectosigmoid junction may be responsible for large bowel obstruction and the patient presents in an acute attack (Table XII)

Table XII

INCIDENCE OF ACUTE LARGE BOWEL OBSTRUCTION DUE TO CARCINOMA OF THE RECTUM

| | | |
|---|---|---|
| *No of cases* | *216* | |
| *Bowel obstruction* | *6* | *(2 8%)* |
| | *Caecostomy* | *2* |
| | *Transverse colostomy* | *2* |
| | *Inguinal colostomy* | *1* |
| | *Ileostomy* | *1* |

*There is a short period of increasing constipation* followed by recurring attacks of colicky abdominal pain and distension The attack which causes the patient to seek advice is one which fails to subside spontaneously and accordingly he presents with severe colicky abdominal pain of a day or two's *duration and which is associated with vomiting and abdominal* distension (Fig 208)

Although some such patients may have been so neglected as to be moribund when first seen the majority are in reasonably *good condition* Examination of the abdomen leaves no doubt as to the presence of a large bowel obstruction whilst digital examination of the rectum will disclose the constricting neoplasm usually some distance from the anus

4 Carcinoma of the Rectum with Atypical Mode of Presentation

*(a) Difficulty with Micturition* —Some patients ignoring the bowel disturbances present with urological symptoms Rectal examination of the prostate and bladder will unexpectedly disclose the tumour

*(b) Diarrhoea of Long Duration* —A few patients present with colitis of some years duration *Rectal examination will disclose* the tumour whilst sigmoidoscopy may reveal polyposis or ulcerative colitis

*(c) Rectovaginal Fistula* —The tumour in the rectum may invade the vagina causing a fistula and incontinence This represents an advanced stage of the disease and hence is *rarely a cause of the patient* seeking treatment initially

*(d) Perforation and Peritonitis* —A constricting tumour in the upper third of the rectum may be responsible for a stercoral ulcer and subsequent perfora

tion of the bowel or the floor of a malignant ulcer of anaplastic structure may slough and cause perforation Patients with perforation are usually too ill to give a satisfactory history but the tumour is felt on rectal examination

(c) *Cachexia* —Occasionally patients are admitted to general medical and surgical wards in an advanced state of cachexia Investigation reveals a carcinoma of the rectum with distant metastases



FIG 208

Carcinoma of rectum causing large bowel obstruction (Mr R sixty three years Carcinoma of upper third of rectum responsible for large bowel obstruction Caecostomy performed on 22nd July 1953 rectum removed by combined operation on 4th August 1953 Patient suffered from tertiary syphilis of central nervous system and developed aspiration lung abscess which was responsible for death four weeks after operation )

## DIFFERENTIAL DIAGNOSIS

The typical case of carcinoma of the rectum presents no difficulty in diagnosis but some conditions may cause confusion

### 1 Villous Papilloma

Typically the villous papilloma has a relatively extensive origin from the surface of the mucosa It is soft and may even pass unrecognised on digital examination The tumour is elevated above the mucous membrane and possesses almost the same colour as the normal mucosa the surface is glisten ing and convoluted (Fig 181) A biopsy will reveal the benign nature of the tumour

*It must be appreciated however that a tumour of this nature will some times possess an area in which malignant changes have supervened* If the surface of the tumour be methodically palpated this zone can be appreciated by the induration imparted to the finger and a biopsy should be taken from this area if this precaution is omitted there s a danger that a malignant tumour might be treated conservatively

## 2 Adenoma

A similar problem arises with an adenoma particularly when of medi
or large size Benign and malignant adenomas may have similar macrosco



FIG 209

Endometrioma of rectum (Miss M., twenty-eight years Nine months diarrhoea Rectal examination disclosed large hard mass in anterior wall of rectum Anterior resection and anastomosis performed on 1 th January 195( Convalescence uneventful )

appearances If the tumour is two centimetres or more in diameter feels firm and has a deep red colour with ulcerations on the surface it is more likely to be malignant than benign (Fig 186)

*Microscopic sections will have to be taken from various places in the tumour because one section may show malignant changes although all others are negative*

### 3 Benign Stricture

Benign strictures often complicate ulcerative colitis but are sometimes seen without any apparent responsible cause Benign inflammatory strictures are produced by fibrosis within and without the rectal walls and although lacking the stony hardness of carcinoma are firm and may prevent the passage of a finger A sigmoidoscopic examination shows little if any mucosal ab normality and biopsy will indicate inflammation as the cause

A carcinoma may be complicated by a similar stricture and a biopsy may fail to reveal malignancy *If the symptoms show a fairly marked progression and palpation reveals a stricture this should be regarded as malignant even if repeated biopsy examinations show inflammatory tissue only*

### 4 Amoebic Granuloma

An amoebic granuloma is easily confused with carcinoma There is usually a considerable disturbance of the normal bowel habit and on digital examination a fairly soft mass can be felt in the rectosigmoid region Sigmoidoscopy shows an ulcerated surface but the tumour is less friable than is a carcinoma A biopsy and a smear should be taken A small sharp spoon with a suitable long handle to allow introduction down the sigmoidoscope is the best instrument with which to collect the specimen This should consist of the actual slough or secretions from the floor of an ulcerated area and is placed directly on a warm slide and mixed with warm saline A cover slip is then placed in position and a microscopic examination made at once (Nevin 1949) If a reasonable doubt about the diagnosis persists a saline purge or a provocative dose of emetine may cause cysts of the amoeba to appear in the stools

*An amoebic granuloma of the rectum may be found in a patient who has never been in a country in which the disease is prevalent* and in such cases is most often seen in those living in old people s institutions

### 5 *Miscellaneous Conditions*

Occasionally unusual conditions such as oleogranuloma or endometrioma are encountered which closely simulate a carcinoma Distinction in these cases may be possible only after careful pathological examination (Fig 209)

## TREATMENT OF CARCINOMA OF THE RECTUM

There is no way of curing a carcinoma of the rectum other than by surgical excision but whether or not such treatment will be advised depends upon the state of the patient and the stage of the tumour

### 1 No Treatment

A small number of patients examined for the first time and found to have a carcinoma of the rectum are in a *semi moribund* or cachetic state and active surgical treatment cannot be contemplated (Table XIII) Some such patients are first seen in the terminal stages of large bowel obstruction and die *an hour or two later*, others are grossly cachetic as a result of diffuse metastatic deposits and chronic blood loss

TABLE XIII

RESECTION OF THE RECTUM FOR CARCINOMA

242 cases

| | |
|---|---|
| No resection | 15 |
| Resection | 227 (94%) |

One patient was referred to the author from an old people s home because *a nursing sister had noticed blood in the* bedpan after a motion the patient was blind of poor mental health and did not complain of any bowel symptoms so that although there was an easily removable tumour in the lower third of the rectum it was felt that a permanent colostomy would prove an impossible hardship *in* the circumstances

The occasional patient refuses operation some believe they can cure themselves others find it impossible to believe that their disease requires *radical treatment and doubtless seek* advice elsewhere whilst a very small number cannot face a colostomy life

Now and again a patient is seen with a carcinoma of the rectum and in whom the anticipated life expectancy is very short by *reason* for example of advanced cardiac failure these patients should be assessed very carefully on the ability or otherwise to tolerate excision and on the amount of discomfort which may follow if the tumour is not removed In a number of such cases *it will be decided not to intervene surgically*

### 2 Laparotomy No Excision

In another very small group of patients *operation is advised and accepted* but on exploration of the abdomen at operation it is found that conditions do not favour removal The decision to leave the rectum is made only after the most careful consideration of the circumstances

*A small primary tumour* of the rectum causing minimal discomfort to the patient but associated with extensive metastatic spread to the liver peritoneum or elsewhere does not necessarily call for excision nor does it require a palliative colostomy *The end* will come long before the tumour reaches a size sufficient to cause mechanical embarrassment

A tumour infiltrating beyond the limits of the rectum and involving the entire pelvic contents cannot be removed without mutilating surgery If there

are no secondary deposits in the liver or elsewhere the surgeon may seriously consider proceeding with such pelvic evisceration as is required but it is doubtful if it is fair to give a patient both a colostomy and an artificial bladder if there are peritoneal or liver metastases

The more experienced the surgical team the greater will be the number of patients who are given the benefit of excision of the rectum At the same time removal of the rectum should not become a point of honour The surgeon must realise that the most he can give the average patient with metastases is a year or two of relative comfort and it is sometimes a matter of fine judgment as to whether this is obtained by palliative excision with or without conserving the sphincters by palliative colostomy or by simple closure of the abdominal wound

3 **Palliative Excision of the Rectum, with or without Colostomy**

Malignant tumours of the rectum are responsible for untold discomfort to the patient and should be removed in the majority of those who seek treatment Of 227 patients subjected to abdomino perineal excision of the rectum eighty four were obviously incurable at the time of operation Secondary deposits in the liver peritoneal metastases and extensive lymph node involvement gave these cases a hopeless prognosis Despite the presence of this dissemination of the tumour the rectum was removed and the patient given a permanent terminal left iliac colostomy or an anterior resection was performed with end to-end anastomosis

In the majority of patients so treated there is a period of considerable improvement in general health It is not surprising to see remarkable gains in weight Tenesmus and frequent haemorrhages from the malignant area are absent In some the relief is short lived and within a few months the patient rapidly declines but in a few instances the patient survives for years despite the presence of proven liver secondary deposits

Palliative excisions do not call for extensive operations At the same time the operation must be done with care because a poorly done palliative procedure will not achieve its object

4 **Radical Excision of the Rectum**

In 143 cases (sixty three per cent of resected cases) it was felt that by radical excision of the rectum a cure was possible Of course in many of these cases the tumour had spread beyond the limits of surgical excision but at operation there was no evidence that this was so The painstaking work of Cuthbert Dukes (1949) and others indicates that survival and perhaps a cure may be expected in at least fifty per cent of these cases

It is very difficult for the surgeon to estimate the significance of nodes which feel large and firm Some glands are enlarged and hard and seemingly involved beyond question by malignant change and yet examination of sections fails to reveal any abnormality other than inflammation Therefore the

surgeon should not abandon a case because of apparent lymph node extension. On the other hand it is not uncommon to find microscopic evidence of infiltration in glands which feel normal

## EXCISION OF THE RECTUM FOR CARCINOMA

In the radical surgical treatment of carcinoma of the rectum one of two procedures has been employed by the writer in nearly every case

1 Abdomino Perineal Excision of the Rectum with Permanent Colostomy

2 Abdominal Resection of the Rectum with End to End Anastomosis and Preservation of Anal Sphincters (Restorative Resection)

### Abdomino-Perineal Excision of the Rectum with Permanent Colostomy

In this procedure the rectum and superior haemorrhoidal lymph nodes are completely removed and the sigmoid colon is brought through the abdominal wall to form a terminal colostomy This is the standard operation which is based on the important researches of Ernest Miles published in 1908 and it is often referred to as the Miles operation

The earliest radical operations for carcinoma of the rectum were performed through a perineal approach aided by removal of the coccyx and perhaps a portion of the sacrum After excision of the rectum the sigmoid colon was brought through the perineal wound usually at its upper posterior or sacral end to form a colostomy this perineal or sacral colostomy proved exceedingly awkward to manage as far as the patient was concerned

In 1884 Czerny whilst attempting to remove a carcinoma situated in the upper part of the rectum by this conventional approach encountered difficulty in reaching the upper limits of the tumour he thereupon completed the operation through the abdomen so becoming one of the first to do a combined abdomino perineal excision of the rectum (Faget in 1739 performed a combined excision of the rectum whilst Lisfranc in 1828 reported another) But the procedure was not generally adopted until Miles re-emphasised the logical nature of the combined abdomino-perineal excision and published his work in 1908 At first the mortality was high and a number of surgeons followed the lead of Lockhart Mummery and persisted with perineal excision although constructing a formal abdominal colostomy either at a preliminary operation or at the same time as performing the perineal excision so avoiding a perineal artificial opening In a series published in 1926 Lockhart Mummery reported a three per cent mortality However Miles and later Gabriel (1934) continued to stress the advantages of the combined operation over the perineal excision and when they demonstrated that it could be carried out with a similar low mortality it became accepted as the operation of election although various modifications in technique have been introduced

To perform this operation most surgeons follow the lead of Bloodgood (1906) Clogg (1923) Kirschner (1934) and Devine (1940) and place the patient in the lithotomy Trendelenburg position The average abdomino perineal excision of the rectum is a relatively easy procedure for the surgeon working on his own especially if he be trained in this field of surgery However if the tumour is large and fixed in a small pelvis the surgeon may be forced to abandon an attempt to excise the rectum unless he has the assistance

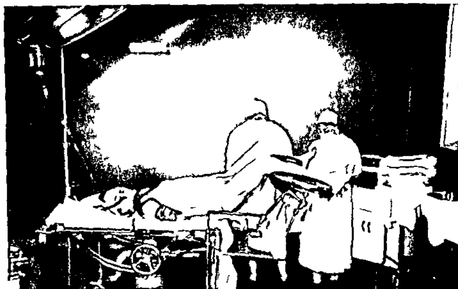


Fig 210
Patient postured on Lloyd Davies stirrups immediately prior to preparing skin and draping

of a surgeon working simultaneously with him It was in 1938 that Lloyd Davies of St Mark s Hospital London suggested this *synchronous combined excision of the rectum* performed by two surgeons working together with the patient in the lithotomy Trendelenburg position By posturing the patient on special Lloyd Davies lithotomy stirrups both abdominal and perineal surgeons can work in comfort and with good exposure (Fig 210)

Although an abdomino perineal excision of the rectum is a formidable procedure it is now performed with a low mortality rate and few patients are regarded as of such poor physique as to be unable to withstand the operation (Table XIV) Successful excisions have been carried out by the writer in sixteen patients over the age of eighty years two of these patients were over eighty five years of age Nor have the very obese patients been unduly disturbed by the operation the heaviest patient in the writer s series was a man of sixty-eight years weighing twenty one stone at the time of operation Several patients have had successful resections despite recent attacks of coronary occlusion or the actual presence of cardiac failure

TABLE XIV

POST OPERATIVE MORTALITY FOLLOWING COMBINED EXCISION OF THE RECTUM FOR CARCINOMA

| 227 cases | 10 deaths | 4 4% |
|---|---|---|
| Ileus | (10 D 7 D) | 2 |
| Bronchopneumonia | (8 D 10 D) | 2 |
| Pulmonary embolism | (14 D 12 D 8 D) | 3 |
| Pulmonary abscess | (16 D) | 1 |
| Pericarditis | (2 D) | 1 |
| Uncertain | (7 D) | 1 |

A carcinoma of the rectum may seem to be large and fixed and may give the impression that it has already invaded adjacent viscera Stenosing tumours in the rectosigmoid zone may be responsible for a chronic large bowel obstruction and an anaemia which might be very marked and lead to the belief that the patient is inoperable especially if faecal masses in the abdomen are mistaken for tumour deposits A surgeon will encounter many cases in which clinically the tumour appears irremovable but at operation it has not only been excised but the post-operative survival has been long enough to justify claiming an apparent cure *Few patients should be dismissed as incurable without laparotomy*

The disadvantage of the combined abdomino-perineal excision of the rectum is the necessity for a permanent colostomy Nevertheless it is the procedure of election for all malignant tumours of the rectum in which there is no evidence of spread beyond the boundary of excision and which lie within ten centimetres of the anus Such tumours are very close to the lateral field of spread (four to eight centimetres from the anus) and this together with the relatively scattered distribution of the pararectal lymph glands as a rule makes them unsuitable for any procedure designed to retain the anal sphincters Occasionally a combined excision of the rectum is necessary for tumours at a higher level when technical difficulties are very considerable as for example in the very obese

If there is evidence of secondary spread from the primary tumour of such an extent as to render the condition incurable the surgeon will accept tumours extending to within eight seven or even six centimetres of the anus as suitable for restorative excisions but care must be taken both in selection and in technique because local recurrence may prove much more distressing than more distant metastases

**Pre-Operative Treatment**

The patient should be admitted to hospital three to five days before operation to provide a preliminary rest to facilitate pre-operative treatment and to give an opportunity for certain investigations to be done

Many of these patients have had little rest in the preceding months on account of diarrhoea and rectal discomfort Hospital rest during the day may permit a sound sleep that night but a sedative may have to be prescribed and should be selected to suit the patient A series of light books to read often produces the most refreshing sleep

To promote a feeling of well being and to stimulate an appetite the patient is urged to engage in a short period of exercise in the mornings afternoons and evenings If the patient has a poor respiratory excursion a physiotherapist may be employed usefully both before and after operation If a normal diet is permitted as it should be vitamin supplements such as vitamin B and vitamin C are unnecessary If the operation is to be a combined abdomino perineal excision of the rectum and there is no possibility of any restorative excision no bowel preparation is necessary and the omission of enemata and bowel washouts will be appreciated by the patient if however the tumour is situated in the upper half of the rectum and there is a chance of restorative excision the bowel should be emptied to facilitate anastomosis Such a patient entering hospital five days before operation is given a bowel washout on admission an enema on the fourth pre-operative day a bowel washout on the third pre-operative day an enema on the second pre-operative day and a bowel washout on the day before the operation In these cases the intestinal sulphonamide succinylsulphathiazole (May & Baker) is given—two and a half grams four times a day—to reduce the virulent bacterial flora of the bowel some of the broader spectrum antibiotics used singly or in combination are undoubtedly more effective in this regard but their use has not proved necessary in the author s experience

If the patient has some medical condition such as cardiac failure which might complicate the operation or post-operative period a consultation should be arranged with the anaesthetist and if necessary a physician soon after admission so that any special measures which may be advised can be put into effect without delay to postpone such consultation until the night before operation is unsatisfactory Blood should be taken for typing and cross typing because transfusion will be required during the course of the operation if the haemoglobin is below eighty per cent of normal on admission it should be restored to a more satisfactory level by a blood transfusion given two or three days before operation

The nature of the colostomy should be explained to the patient before operation The author does not mention this matter at the initial consultation unless it is specifically raised by the patient On the day following admission to hospital a booklet describing the colostomy and its management is given to the patient and the problem is discussed A surprising number of patients have already suspected that this may be required while to others the idea of a colostomy comes as a shock but from which they usually recover quickly when they are made to realise how little it will inconvenience them and how anything short of such surgery may well prove disastrous



A



B

Fig 211

A—Operation about to commence Note position of anaesthetist to one side of patient and instrument tray over the head

B—Operation in progress Anaesthetist controls patient from one side of head of table instrument sister is at head of table behind instrument tray surgeon is on patient's left with first assistant opposite perineal surgeon has two assistants

**Preparation in Theatre Immediately Before Commencing Operation**

The patient is given a general anaesthetic (Chap 5) If an intravenous transfusion has not already been commenced it is now set up into a vein on the radial side of the right forearm so that it will be on the opposite side to the surgeon The bladder is emptied with a catheter and in the male this is tied into position The bedclothes and all binders and other drapes applied in the ward are removed and the patient lifted on to the operating table fitted with the Lloyd Davies lithotomy stirrups The buttocks are so placed that the coccyx projects not less than three inches beyond the edge of the perineal rest The legs should be flexed not more than forty five degrees at the hips and are widely abducted although the extent to which this is possible varies The Lloyd Davies stirrups were designed to give maximal exposure and comfort in both the abdominal and perineal dissections without altering the posture of the patient during the course of the operation if the thighs are too flexed the abdominal surgeon is cramped whilst if the legs are not ab ducted enough the perineal dissection will be hampered

The arms are placed alongside the patient and the shoulder rests are adjusted to fit snugly In male patients the scrotum is strapped to the right away from the operating field

It is useful to do a rectal examination at this stage as it will help decide the operation to be performed If the tumour is in the lower half of the rectum and a combined excision is to be performed a purse string ligature (No 16 hollow woven silk) is inserted around the anus and tied tightly If the tumour is situated in the upper part of the rectum and a restorative excision is contemplated an angled self retaining catheter of the Winsbury White type is inserted into the anal canal manipulation of the bowel during the operation will often push faecal material down the tube and out of the rectum so reducing soiling after cutting through the rectum below the tumour

The abdomen and perineum are swabbed with a lotion containing Zephi ran acetone and alcohol but in contact with the scrotum or vulva this may cause a skin reaction so that aqueous solutions only should be used for those parts Sterile drapes are applied in a way that will leave the abdominal and perineal operative fields uncovered The abdominal dissection is most easily accomplished from the patient s left side the assistant surgeon stands on the opposite side The instruments are placed on a tray over the patient s head the theatre sister stands at the head of the table directly behind this tray of instruments and thereby has the operative field constantly under observation The anaesthetist is placed at the side of the head of the table (Fig 211) The perineal dissection is facilitated if the surgeon can sit opposite the perineum and a spare hand from assistants should be available on either side

**Abdominal Dissection**

The incision may be either a lower left paramedian or an oblique in the left iliac fossa (Fig 212) The lower left paramedian should extend from

the pubis to about an inch above the level of the umbilicus It provides an excellent exposure not only for the surgeon but also for the assistant and the latter is much more useful when he can see what is happening If the pedicle is to be ligated at its uppermost level the incision can be easily extended This is the incision preferred for all operations in which a restorative excision of the rectum is contemplated

The oblique incision extends from the pubic tubercle upwards and outwards and passes just lateral to and ends a short distance above the midpoint on the line which joins the umbilicus to the left anterior superior iliac spine

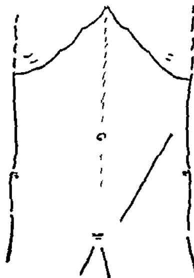


FIG 212
Oblique incision in left iliac fossa Extends from pubic tubercle upwards and outwards and crosses just lateral to the midpoint in the line which joins umbilicus to anterior superior iliac spine

The incision follows the direction of the fibres of the external oblique aponeurosis which is split in the length of the wound The internal and transversus abdominis muscles are divided together at right angles to the muscular bundles The inferior epigastric vessels are identified in the extra peritoneal fat in the lowest part of the incision and they require division between ligatures The peritoneum is incised to the lower limits of the incision avoiding the bladder The oblique incision facilitates construction of the colostomy and is preferred when there is no possibility of performing a sphincter saving operation

The liver is felt for metastases and the colon throughout its length for an unsuspected second primary neoplasm The peritoneum of the main and pelvic peritoneal cavities is palpated for metastatic nodules The exploring hand finally moves down to the tumour in the pelvis The tumour is not handled until the peritoneal cavity has been explored because of the possibility of spreading tumour cells The relation of the carcinoma to the peritoneal reflection is noted because if it lies below this level and in the lateral rectal field local recurrence is more likely and as wide an excision as possible of the pelvic fascia is desirable if the tumour lies above the peritoneal reflection the main lymphatic spread is upwards and the pedicle should be ligated at the highest level possible although the need for close dissection of the pelvic fascia is absent The size of the tumour in relation to the pelvis is estimated a small tumour in a large pelvis is usually compatible with a quick operation but a large tumour in a small pelvis may mean a very difficult operation If the tumour involves an adjacent organ an extended form of operation will be required and one which may well result in a wide pelvic resection The lymph nodes along the inferior mesenteric vessels are palpated but their enlargement does not influence the operation

The sigmoid colon is held by the assistant whilst the small intestine and omentum are packed away into the upper peritoneal cavity Some Trendelenburg tilt is usually required for this manoeuvre but should not be any more than is necessary



Fig 213

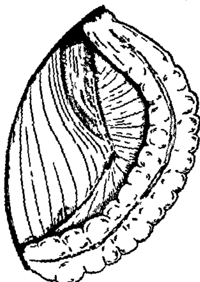


Fig 214

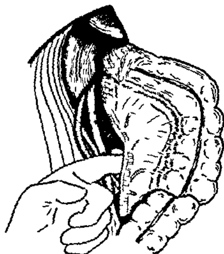


Fig 215

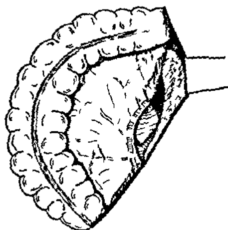


Fig 216

Fig 213—Division of developmental adhesions on outer aspect of sigmoid colon Division should be made on mesenteric side of attachment

Fig 214—Line of incision to left of mesosigmoid and mesorectum

Fig 215—Incision along left side of mesosigmoid and mesorectum with exposure of left ureter Finger passed under inferior mesenteric vessels taking special care to avoid ureter

Fig 216—Incision on right side of mesosigmoid and mesorectum

Developmental adhesions are nearly always present on the outer side of the sigmoid colon and require division (Fig 213) With care this can usually be done without causing any defects in the peritoneum on the lateral side of the sigmoid colon The assistant now holds the free sigmoid colon to the

right and an incision is made at the base of the *mesentery* just below the sigmoid peritoneal fossa (Fig 214) *This incision is* enlarged into the fossa and distally along the base of the mesosigmoid *and mesorectum* for a short distance The ureter is identified in the retro peritoneal *fat and is freed* from any relation to the inferior mesenteric vessels as far proximally as possible *Unless this is* done there is danger of it becoming included *in the ligature* placed around the inferior mesenteric vessels (Fig 215) A similar incision is made on the right side of the mesosigmoid and *mesorectum after the sigmoid* colon has been swung back to the left side (Fig 216) *it is not usually necessary* to dissect out the ureter on the right side although if the tumour is large it should be done at this stage

The sigmoid colon is swung back to the right side and a finger passed from left to right under the inferior mesenteric vessels and superficial to the

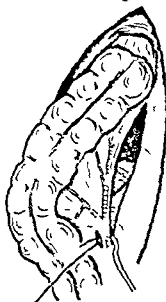


Fig 217

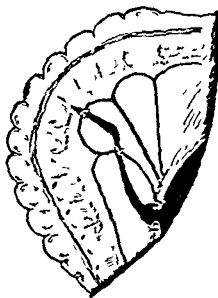


Fig 218

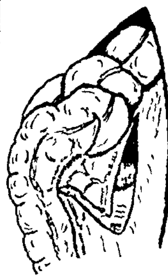


Fig 219

Fig 217—Ligation of pedicle above level of bifurcation of aorta

Fig 218—After ligation and division of inferior mesenteric vessels incision carried through mesosigmoid in such a way as to ensure adequate blood supply to colostomy

Fig 219—After ligation and division of inferior mesenteric vessels the incision in mesentery carried directly across to sigmoid colon if redundant

ureter the tip of the finger is thrust through the retroperitoneal tissue into the peritoneal incision on the right of the mesosigmoid Aided by sharp and blunt dissection this finger is gently moved upwards to the level at which the pedicle is to be ligated For low lying tumours the pedicle is ligated just below the left colic vessels about the level of the bifurcation of the aorta But for tumours situated above the peritoneal reflection where the important spread is almost entirely in an upward direction and where there is little danger of local recurrence the pedicle is ligated above the left colic vessels to include in the resected specimen lymph nodes at this level The pedicle is ligated with heavy silk (No 4) which is passed around and tied in continuity a second ligature

is placed below the first and the pedicle divided between the ligatures (Fig 217) *It is most important to check the position of the left ureter before each tie is placed in position and again before the pedicle is finally divided* This is one of the places where this important structure may be injured

From the divided pedicle an incision is continued through the sigmoid mesentery towards the marginal artery at the site at which the bowel is to be divided (Figs 218 219) this site will be decided by trial and error with a view

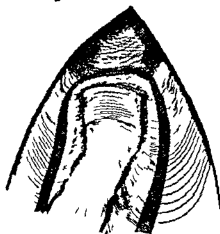


Fig 220

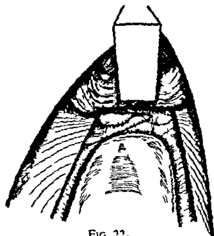



Fig 222

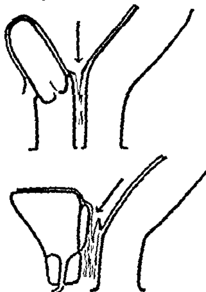


Fig 221

Fig 220—Incision in peritoneum

Fig 221—In female patient incision in peritoneum anterior to rectum should be made in depth of pouch of Douglas In male should be about two centimetres above this level on posterior surface of bladder

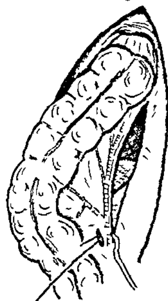
Fig 222—Exposure of seminal vesicles Anterior incision in peritoneum deepened to expose tip of vesicles and dissection deepened immediately behind them

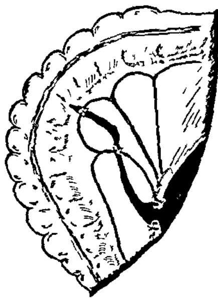
to allowing the bowel to be brought up to the skin without any tension The marginal artery is divided and tied and it is usually necessary to ligate at least one other set of vessels between the pedicle and marginal vessels Having dealt with the main pedicle of the tumour the affected bowel can be manipulated with less fear of detaching tumour emboli

The incisions in the peritoneum at the base of the mesosigmoid and mesorectum are carried distally and at the peritoneal reflection in the depth of the pelvis curve forwards and then medially to run transversely and meet in front of the rectum (Fig 220) In the male patient this transverse incision in the

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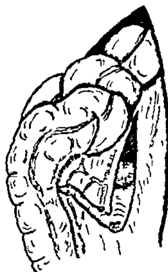


FIG 217 FIG 218 FIG 219

FIG 217—Ligation of pedicle above level of bifurcation of aorta

FIG 218—After ligation and division of inferior mesenteric vessels incision carried through mesosigmoid in such a way as to ensure adequate blood supply to colostomy

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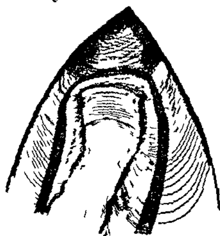


Fig 220

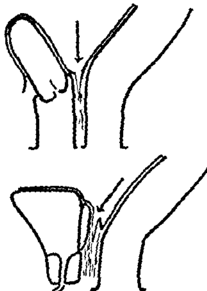


Fig 221

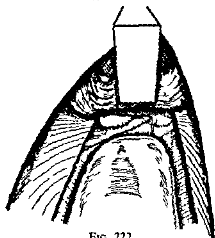


Fig 222

Fig 220—Incision in peritoneum

Fig 221—In female patient incision in peritoneum anterior to rectum should be made in depth of pouch of Douglas In male should be about two centimetres above this level on posterior surface of bladder

Fig 222—Exposure of seminal vesicles Anterior incision in peritoneum deepened to expose tip of vesicles and dissection deepened immediately behind them

to allowing the bowel to be brought up to the skin without any tension The *marginal artery is divided and tied and it is usually necessary to ligate at least* one other set of vessels between the pedicle and marginal vessels Having dealt with the main pedicle of the tumour the affected bowel can be manipulated with less fear of detaching tumour emboli

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*peritoneum of the pelvic floor should be placed just above and anterior to the* floor of the pelvic peritoneum on the posterior aspect of the bladder in the *female patient however it should lie in the deepest portion* (Fig 221) If this is done it will be found that the surgeon will enter the correct plane for the anterior dissection below the level of the peritoneal reflection After dividing the peritoneum in the male the vesicles will be observed and by cutting a few fine strands of tissue the surgeon will find himself between the layers of the fascia of Denonvilliers (Fig 222) Two fingers inserted into this space can be gradually pushed without difficulty as far distally as the apex of the prostate and laterally almost to the wall of the pelvis If a retractor is inserted it will be observed that the walls of this plane are smooth white and glistening and resemble the peritoneal covering In the female subject a similar plane is entered and two fingers inserted into the potential space can be thrust well down behind the posterior wall of the vagina and laterally towards the pelvic walls the anterior and posterior layers of the fascia of Denonvilliers are not nearly so well defined as in the male and the resemblance to the *peritoneum is less marked* The anterior dissection from the abdomen is completed when this anterior plane has been defined



*Fig 223*
Posterior dissection commenced by retracting rectum and mesorectum *forwards and by proceeding dis*tally in loose areolar tissue behind these structures

The posterior dissection is performed comparatively quickly The lower *end of the divided pedicle is held forward* and by a combination of sharp and blunt *dissection is separated from the anterior* aspect of the sacrum (Figs 223 224) As *the rectum and pedicle are retracted for*ward the presacral space partly obliterated by *areolar tissue is easily displayed* This separation of the rectum from the sacrum is *continued in the midline to the coccyx* where the tendinous origin of the pubo*coccygeus can be felt* The plane of separation extends laterally to the side wall of the *pelvis although over the lower half* of the sacrum sharp dissection is required and it *might be found more satisfactory to await* completion of the lateral dissection to obtain better exposure In this *posterior dissection care should be taken not to dissect too close to the pedicle*

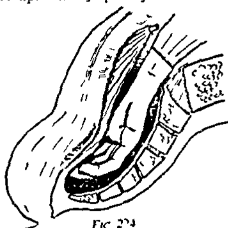


*Fig 224*
*Posterior dissection* completed by passing hand downwards behind rectum as far as fascia of Waldeyer

with its lymphatic pathways several sheets of fascia can be stripped off the anterior wall of the sacrum and the surgeon should proceed behind the posterior layers At the same time it is most undesirable to approach so close to the sacrum as to tear veins because these are difficult to secure with artery forceps and a considerable amount of blood may be lost relatively quickly If the tumour is below the level of the peritoneum it is important that the dissection should include as much of the pelvic fascia as possible if the tumour is above the peritoneal reflection excision of the fascia need not be so meticulous



Fig 225
Thin layer of retro peritoneal tissue above peritoneal reflection may be divided without fear of encountering any large vessel

After the anterior and posterior dissections have been completed the sheet of extraperitoneal tissue on either side of the mesosigmoid and mesorectum is divided (Fig 225) This is the tissue which lies between the posterior plane and the peritoneal cavity and is defined by the posterior dissection carried to the lateral pelvic wall Below the level of the peritoneal reflection the lateral tissue to be divided lies between the anterior and posterior planes of the dissection near the lateral wall of the pelvis this sheet of tissue is well defined and contains the middle haemorrhoidal vessels and accompanying lymphatics whilst the ureter can be seen coursing above it and curving sharply forwards to enter the bladder The lateral tissue on the right side is first divided with the scissors as close to the lateral wall of the pelvis as possible (Fig 226) If this is done piece by piece vessels cut within the ligament can be secured with long artery forceps and tied (Fig 227) The lateral tissue is divided as far as the upper surface of the levator ani muscle The procedure is repeated on the left although this side is a little more awkward to do It is usual to encounter short strong fibrous bands running from the lowest portion of the rectum in a postero lateral direction towards the sacrum After division of the lateral tissue these bands still remain to be cut with scissors

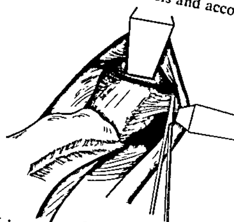


Fig 26
If lateral ligaments divided from above usually possible to visualise any bleeding vessels and grasp them in long artery forceps

If the combined excision of the rectum is performed by two surgeons operating synchronously one on the perineum and the other on the abdomen



Fig 227
*Long curved artery forceps useful for securing middle haemorrhoidal vessels in excisions of rectum*

the rectum will now be freed and is delivered into the abdominal wound If the surgeon is performing the combined operation on his own he will place a pack in the abdominal wound and move to the perineum after completing the perineal dissection he moves back to the abdomen to deliver the rectum into the abdominal wound

The peritoneum of the pelvic floor is sutured with a continuous layer of fine chromic catgut This stitch commences at the anterior end of the defect and proceeds backwards finally to cover the ligated pedicle stump (Fig 228) The peritoneal flaps can be approximated without tension if they are first freed from the underlying retroperitoneal tissue At intervals interrupted sutures should be inserted and tied to the continuous suture *One of the most common causes of post-operative mortality and morbidity following abdomino-perineal excision is an inadequately sutured pelvic floor*

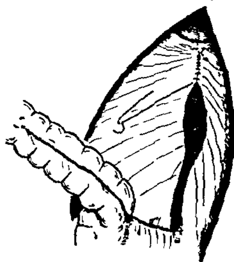


Fig 228
Peritoneal floor sutured with continuous chromic catgut with interrupted sutures placed at intervals Usually possible to suture peritoneal defect in *linear fashion if peritoneum first* undermined and lifted off und rlying tissue

The omentum is brought down from the upper abdominal cavity after the packs have been removed and is placed over the sutured floor of the pelvic peritoneum If an oblique incision has been made the rectum and lower sigmoid colon still attached to the proximal sigmoid colon are drawn out of the wound and are held supported on the abducted and flexed left thigh The space between the emerging colon and the peritoneum of the lateral wall is closed with catgut (Fig 229) If this is not done a potential hernial orifice within the abdomen remains Closure of this space is effected by inter

rupted or continuous sutures There is a sharp line of demarcation between the cold bluish distal colon and rectum and the warm pale pink proximal colon

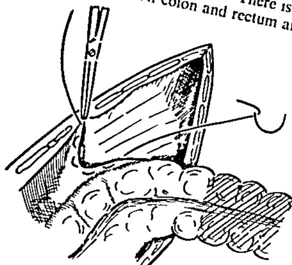


Fig 229
Lateral space closed by chromic catgut stitch May use single stitch or interrupted sutures

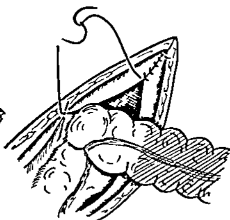


Fig 230
Stitch in lateral space left long Peritoneum closed with continuous chromic catgut stitch

the line of change corresponding to the site of ligature of the marginal artery *It is most important that this level be identified because viable bowel must reach the level of the skin without tension* The abdomen is sutured in four layers the peritoneum is closed with a continuous chromic catgut suture and the end of this continuous ligature is tied to the end of the ligature closing the lateral space (Figs 230 231) The transversus abdominis and internal oblique muscles are sutured together as a single layer whilst the external oblique aponeurosis is sutured in such a way that the colon emerges through the upper end of the wound and in many cases it will pass through the muscular portion of the external oblique muscle rather than the tendinous aponeurosis The skin is closed with interrupted silk sutures and is dressed with tulle gras (Fig 232) The colon is

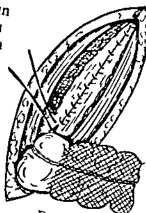


Fig 231
Peritoneum sutured with continuous chromic catgut stitch end of which tied to long end of stitch in lateral space

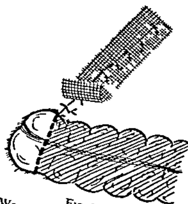
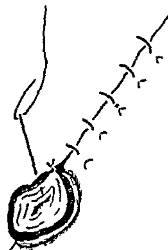


Fig 232
Wound covered with single strips of tulle gras before colon is divided along line separating viable from non viable bowel

*amputated through* the line of demarcation separating viable from non viable bowel If this line is selected *bleeding is minimal* The proximal cut end of the colon is then sutured to the *skin of the upper* end of the wound in such a way as to obtain mucosa to-skin apposition (Figs 233 234) The colon passes through the layers of the abdominal wound with just sufficient room to permit a finger to be inserted along side the colon into the peritoneal cavity the only sutures between the colon and the abdominal wall are those joining the mucosa to the skin



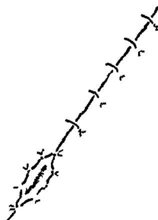


FIG 233 FIG 234

FIG 233—Mucosa and skin sutured with interrupted 2/0 chromic catgut on straight cutting edge needle
FIG 234—Wound at completion of operation

If a left paramedian incision was made initially the *colon and rectum* are brought through a second oblique incision in the left iliac fossa two or three inches long and placed at right angles to the line joining the umbilicus to the left anterior superior iliac spine just lateral to the middle point The lateral space is closed after exposing it through the paramedian incision and the colostomy constructed in the same way as described for the longer oblique incision The paramedian incision is closed in layers The wounds and the colostomy are dressed with tulle gras no precautions are needed to prevent contamination of the abdominal wounds from the colostomy because these wounds have always sealed although not healed by the time the latter works





FIG 235
Incision for perineal dissection in combined abdomino-perineal excision of rectum

**Perineal Dissection**

The incision is triangular in shape with the base anterior to the anus and the apex immediately posterior to the tip of the coccyx The posterior end of the wound heals better if it deviates to one side of the midline out of the natal cleft The area of skin excised

need not be extensive and the sides of the triangle are carried quite close to the anus (Fig 235)

Posteriorly the incision is deepened and the coccyx exposed The tip is forcibly pushed forward with the thumb of the left hand and an inter coccygeal or the sacro-coccygeal joint sought with the knife held in the right hand (Fig 236) The joint is easily cut through it is not necessary to remove the whole of the coccyx and if the posterior dissection has been completed from the abdomen it may be unnecessary to remove any of it at all in which case the incision is deepened just distal to the tip As the knife cuts through the sacro-coccygeal joint the fascia of Waldeyer is often incised at the same time sometimes a portion of this fascia remains and requires deliberate incision as a separate structure before the presacral plane is entered The posterior dissection is readily and rapidly completed by a combination of blunt and sharp dissection in this plane If the posterior dissection has not been satisfactorily completed from above and the coccyx is not removed difficulty might be experienced in entering the correct plane the deep post anal space between the coccygeal attachments of the external sphincter and the levator ani muscles may confuse the surgeon and lead to perforation of the rectum

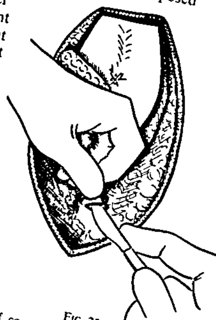


Fig 236
Tip of coccyx pushed forwards and inter coccygeal or sacro coccygeal joint disarticulated

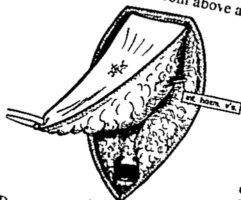



Fig 237
Dissection through ischio rectal fossa will expose inferior haemorrhoidal vessels which should be secured before being divided

The skin incision is deepened through the ischio-rectal fossa and the inferior haemorrhoidal vessels are sought before division (Fig 237) From behind the fingers are pushed forwards into the tissues immediately above the ileo-coccygeus muscle (Fig 238) This muscle is in the form of a thin sheet superficial to the remainder of the levator ani muscle and at its anterior edge the finger re-enters the ischio-rectal fossa the muscle is then divided on the outer side of the forefinger The pubo-coccygeus and pubo-rectalis muscles are much more closely

related to the rectum and anal canal A finger passes over their lateral edge on to their upper and inner surface and the muscle is divided with scissors

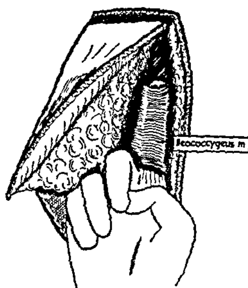



Fig 238
Finger placed under thin sheet of ileo coccygeus muscle which is then divided on outer aspect of finger

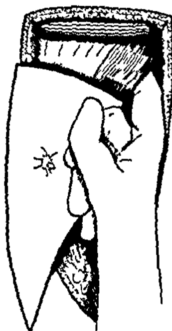


Fig 239
Finger hooks over pubo coccygeus and pubo rectalis muscles

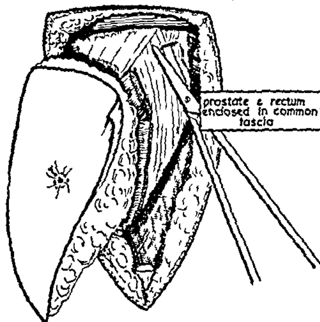



Fig 240
Anal canal and rectum retracted to one side fascia common to prostate and rectum incised to expose space between two structures

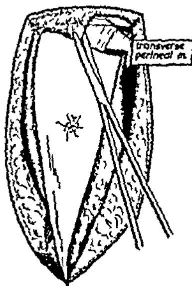



Fig 241
Anterior dissection commences Posterior border of transverse perineal muscle exposed

anterolateral to the finger This division is continued towards the midline until it seems that the muscles have been completely divided (Fig 239)

The partially freed anal canal and rectum are retracted towards the right and the remainder of the fascia of Waldeyer divided to display its lateral aspect In the male patient a sulcus between the prostate and rectum can be palpated through the fascia common to both structures (Fig 240) this is incised and a finger inserted between the two structures

To complete the anterior dissection the left hand draws the anal canal and rectum posteriorly and the skin incision (at the base of the triangle) is deepened cautiously through the subcutaneous tissue immediately behind the superficial transverse perineal muscle the fibres of which are pushed forward

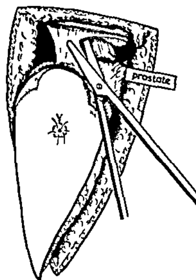



Fig 242
Thick bridge of tissue anterior to rectum may be divided without fear of damaging rectum or urethra if space between rectum and prostate be first defined

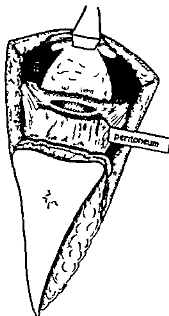



Fig 243
Dissection carried upwards between rectum and prostate to meet peritoneum

(Fig 241) The anterior extension of the superficial part of the external sphincter muscle reinforced on its upper surface by the recto-urethralis muscle and the fascia of Denonvilliers presents a barrier to further dissection The fingers and thumb of the left hand are inserted into the plane already identified between the prostate and rectum and with the positions of the prostate and urethra anteriorly and the rectum and anal canal posteriorly accurately defined the intervening tissue can be divided (Fig 242) The dissection can then be taken without further difficulty to the peritoneal incision (Fig 243) It is surprising how much of the pubo rectalis and pubo-coccygeus muscles remain to be cut in this phase of the dissection If the correct plane between the two layers of the fascia of Denonvilliers has not been entered it is usual to proceed upwards posterior to the posterior layer of the fascia of

Denonvilliers the operation is rendered more difficult less radical and the rectum is in danger of perforation

In the female patient a similar dissection routine is effective although the operation is made easier if a finger is kept in the vagina to direct the dissection The fascia of Denonvilliers is not nearly so well defined in the female

The rectum is now virtually free but if the pelvis is small and a large tumour has prevented complete dissection from above the lateral ligaments should be divided from below The finger is passed upwards behind the lateral ligament and by flexing the tip through the areolar tissue continuous with

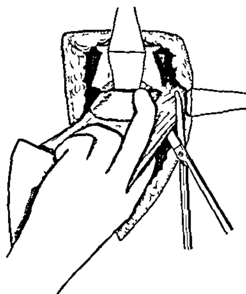


Fig 244
Division of right lateral ligament Bleeding vessels secured with long artery forceps

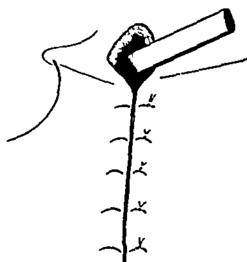


Fig 245
Skin sutured with interrupted silk sutures placed in such a way as to obtain accurate apposition of skin edges No deep sutures inserted Drain tube brought through anterior end of wound

it above the ligament can be hooked down When the lateral ligament is divided from below it is easier to clamp it with a pair of long artery forceps before division because the middle haemorrhoidal vessels retract from view when divided from above however this is not necessary because the vessel can be secured quite easily from this aspect (Fig 244)

When the rectum has been freed a rubber glove is tied around the anal end and the specimen is passed into the abdominal cavity Haemostasis is secured and a drainage tube inserted so that the tip lies in the hollow of the sacrum The perineal wound is sutured with a single layer of interrupted silk sutures placed in such a way as to allow the drainage tube to issue from the anterior end of the wound (Fig 245)

**Post Operative Treatment**

Resuscitation —Any Trendelenburg tilt which may have been necessary is gradually corrected Dressings are applied to the wounds and the patient

is then lifted off the operating table into his bed which should be brought to the theatre in place of a trolley no matter how satisfactory the condition of the patient might be Whole blood is given during the operation and the volume will depend on the amount lost and the patient s reaction to operative trauma There is usually a considerable amount of slow bleeding into the perineum for the first twenty four hours so it is almost certain that in this time an extra half or one litre of blood will have to be given intravenously Normal saline and dextrose water (one litre of normal saline and two litres of dextrose water in twenty four hours) are given intravenously until the patient is able to take sufficient fluids orally which may be the second third or fourth post operative day For the first six hours after the operation the foot of the bed is elevated in order to reduce venous oozing from the perineum Intranasal oxygen is advisable until the patient is fully conscious in order to ensure maximal oxygenation of the blood



FIG 246
Perineal drainage tube connected with closed drainage bottle at conclusion of operation Maintained for four days post operatively

PERINEAL WOUND —The perineal drain tube is connected with a closed drainage system this is effective and in most cases drainage into the dressings around the tube is negligible (Fig 246) Previously it was the practice to allow this tube to drain directly into the perineal dressings and this necessitated frequent changes in the immediate post operative period The drainage tube is removed on the fourth post-operative day and the sutures on the seventh Dry dressings are preferable to petroleum jelly or other sticky material

BLADDER —The urethral catheter is connected with a bedside bottle and continuous drainage maintained until the intravenous infusion is stopped and the patient is able to move around in bed more freely The catheter is then removed and in most cases normal micturition follows although the bladder empties incompletely at first If the patient cannot void after removing the catheter it will be necessary to pass a catheter at intervals If retention persists despite intermittent catheterisation for forty-eight hours the catheter

should be re inserted and tied in for a second period of thirty six or forty-eight hours and then removed Sometimes this *manoeuvre has to be repeated a* third time If after two or three weeks voluntary micturition has not been re-established more active measures such as prostatectomy will have to be *considered*

*Colostomy* —The colostomy nearly always remains quiescent until the third or *fourth day* and then for a day or two it *tends to overact If there* has been no colostomy action by the fifth day two glycerine suppositories are inserted and are repeated daily until a colostomy action has been obtained Rarely is it necessary to prescribe an aperient If the colostomy is over active the patient *must be reassured* that it will soon settle again it is unusual *for* this to be so troublesome as to require special treatment *On* the tenth post-operative day following removal of the sutures *the patient* may be supplied with a disposable bag outfit and is *given advice on how* to regulate the bowels by dietetic means If this proves unsatisfactory and the bowels remain irregular a colostomy washout should be *considered* as a daily procedure Colostomy washouts should not be instituted immediately, but only after a trial period *of two or three months with disposable colostomy* bags

General Nursing —Pain is relieved by *morphia* (gr ¼) or pethidine (100 mg) Nothing is permitted by mouth until bowel sounds can be heard through *the* stethoscope indicating a return of peristaltic activity the initial fluid diet is replaced by a semi solid one and by the seventh day after operation the patient *should* be on a full diet The sutures are removed from the perineum on the seventh post-operative day and from the abdominal wound on the tenth post-operative day It is not necessary to remove the catgut sutures in the colostomy The patient is allowed out of bed when he feels like it which is usually around the fourth or *fifth* day after operation Most patients return home at the end of the second week or *in* the third week after operation

## COMPLICATIONS OF COMBINED EXCISION OF THE RECTUM

**Shock**

A certain amount of blood loss is inevitable and the degree of shock which accompanies the operation seems directly proportionate to the volume of blood lost Despite the magnitude of many of these operations shock is rarely fatal and the writer has not lost a single patient from this complication However it cannot be denied that lesser degrees of hypoxia are not uncommon and may be responsible for serious and subsequently fatal complications Prevention is all important The haemoglobin is brought to a satisfactory level before operation so that blood loss is better tolerated Blood is replaced at the rate at which it is lost during the operation and this requires the closest co-operation in the surgical team during the operation The patient should

be removed from the lithotomy Trendelenburg position gradually and gently because the blood return from the lower extremities may prove sluggish if they are allowed to become suddenly dependent and this will lower the effective circulating blood volume The amount of blood draining from the perineum in the first twenty four hours after the operation must be kept under continual observation and replacement effected volume for volume

Prevention and prompt correction of shock is important and the writer acknowledges his indebtedness to Dr E B Dreverman who has personally supervised so many of these patients before during and after operation

**Haemorrhage**

Bleeding from the inferior and middle haemorrhoidal vessels and from the middle sacral artery may be brisk and accordingly these vessels should be specially sought and individually ligated during operation

A severe haemorrhage usually comes from the thin walled veins on the side walls of the pelvis and from the plexus of veins on the posterior aspect of the prostate and vagina The bleeding vessel may be difficult to localise and difficult to secure with artery forceps and tie If the vein cannot be identified it may be necessary to leave packing gauze in the cavity if the vessel can be secured but not ligated the patient may have to be returned to the ward with long artery forceps in place Packing or forceps are removed twenty four to forty-eight hours later

Annoying and sometimes considerable loss of blood from the superficial tissues can be prevented by preliminary infiltration of the area with adrenalin in saline solution (1 250 000) this does not have any ill effect on wound healing nor has it disturbed the anaesthetist

Rarely after the patient s return to the ward there is a severe reactionary haemorrhage and unless this shows early signs of stopping spontaneously the patient should be returned to the theatre and anaesthetised the perineal sutures removed and blood clot evacuated Bleeding vessels should be secured and ligated

**Urological Complications**

URINARY FISTULA —In the course of excision of the rectum the dissection proceeds very close to the ureter in both sexes and the bladder and urethra in the male If the *ureter* is damaged and not repaired a urinary fistula will develop which will require nephrectomy to close A portion of the *bladder* will have to be excised if the tumour is adherent to it and the defect sutured although quite large holes will close spontaneously provided continuous suction is kept on the bladder post-operatively A supra pubic cystostomy should be done if it is anticipated that catheter drainage will be required for some time Damage to the *membranous urethra* is rare The injury should be repaired at the time and a catheter left in the urethra for about fourteen days after operation if it is not detected at the time of the operation the

resulting fistula will only be observed when the catheter is removed from the bladder The catheter should be replaced and kept in position for fourteen days and thereafter regular dilatations with sounds may be required to prevent stricture formation Occasionally local recurrence of the malignancy is responsible for a delayed appearance of a urinary fistula

URINARY RETENTION —After removing the catheter on the second or third post-operative day *forty per cent of the patients have no further trouble with* micturition whilst another thirty per cent recover after an initial delay of *twenty four to forty-eight hours* The remaining thirty per cent of patients may have a residual urine of 150 cubic centimetres or more on the tenth post operative day but practically all of these are emptying their bladders satisfactorily at the end of three weeks from the time of the operation (Watson 1951)

RETENTION DUE TO ALTERATION OF POSITION OF BLADDER FOLLOWING OPERATION —Williams (1951) demonstrated that in the male the whole of the prostatic urethra drops back with the bladder after excision of the rectum Although this will hinder the urinary outflow in the recumbent patient particularly *if he is debilitated it is probably not important when the patient is* ambulatory

RETENTION DUE TO PROSTATIC ENLARGEMENT —Retention of urine with *more than slight degrees of prostatic enlargement* is frequent and often prolonged but the outlook is very good Once the patient is up and about again micturition returns to the pre-operative state occasionally the patient notices an improvement in the stream whilst very rarely prostatectomy is required Before the rectum is removed it is impossible to select the patient in whom a prostatectomy will be required and the surgeon should not be hurried into making a decision in favour of prostatectomy before or after excision

RETENTION DUE TO PELVIC NERVE DAMAGE —The pelvic nerves (nervi erigentes) may be injured near their origin from the second third and fourth sacral nerves Such an injury may follow removal of a tumour in the upper half of the rectum which is adherent to the sacrum or may be due to dissection deep to the fascia of Waldeyer rather than anterior to it When the catheter *is withdrawn no urine* is passed the bladder becomes progressively distended and if allowed overflow incontinence occurs After a variable period micturition is re-established by *straining the abdominal musculature* the urine is infected and the patient incontinent but later spontaneous improvement alleviates discomfort

URINARY INFECTION —*Urinary* infection after excision of the rectum is not particularly important Most patients show some such evidence after the operation and in seventy per cent it is still present when the patient is discharged from hospital but it rarely persists more than a month or two Acute episodes of cystitis pyelonephritis and epididymitis *occasionally complicate* the residual infection

**Disturbance of Sexual Function**

The majority of patients have perfectly normal sex function after excision of the rectum although intercourse is rather less frequent and with the passage of the years becomes even less so Goligher (1951) investigated the matter and found that one third of the patients are impotent after the operation and of those retaining potency one third are sterile The cause of this disturbance is probably injury to the parasympathetic (pelvic) or sympathetic nerves as a result of freeing the rectum from the sacral bed

**Intestinal Obstruction**

Symptoms of intestinal obstruction are not infrequent after combined excision of the rectum Usually these are due to mild paralytic ileus from which spontaneous recovery is usual but a true mechanical obstruction may be present In a consecutive series of 1 302 cases from St Mark s Hospital Goligher Lloyd Davies and Robertson (1951) noted an incidence of approximately three per cent (Table XV) Most cases of mechanical obstruction manifest themselves within a month of the operation

TABLE XV

POST OPERATIVE SMALL BOWEL OBSTRUCTION FOLLOWING EXCISION OF THE RECTUM FOR CARCINOMA IN 227 CASES

| 7 cases | 3 1% |
|---|---|
| Operation and recovery | 4 |
| Operation and died | 2 |
| Discovered autopsy | 1 |

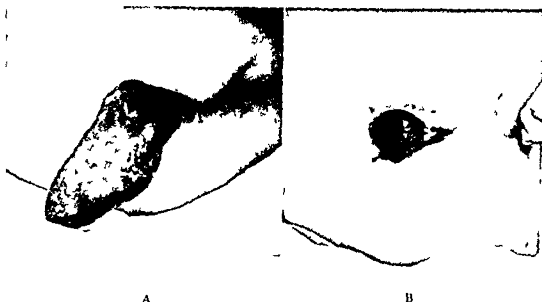
The obstruction may be due to adhesions or other lesions not specifically related to the nature of the operation but the majority are caused by adhesion to or herniation through the pelvic peritoneal suture line or by adhesions or herniation in the vicinity of the colostomy Gabriel (1928) drew attention to the danger of small bowel herniation in the space between the colostomy and the lateral abdominal wall but now that most surgeons follow his advice and close this space obstruction from this cause is rare

Recognition of obstruction developing in the early post-operative period may prove very difficult This is especially so if the symptoms appear immediately after the operation or if symptoms and signs are atypical For example if pain is absent or if pain is not accompanied by exaggerated peristalsis the surgeon might prefer to observe the patient in the expectation of spontaneous recovery only to discover and too late perhaps that mechanical obstruction is present The surgeon should be *constantly alert for this complication* and should not hesitate to perform a laparotomy if there is any suspicion of obstruction The diagnosis of late obstruction arising after the patient s discharge

from hospital is usually easy, but *there is a danger that it will be treated conservatively under the mistaken impression that recurrent malignancy is the cause*

**Colostomy Complications**

COLOSTOMY STENOSIS —Previously it was the practice to deliver the colon on to the surface of the abdomen so that the mucosa of the colon was at some distance from the skin the intervening serosal surface becomes covered by granulation tissue which contracts as it matures and by the time mucosa and skin come into apposition a tight fibrous ring has formed Colostomy stenosis is responsible for considerable local discomfort interferes with colon



A B

FIG 247

A—Dr S Rectum excised and sacral colostomy fashioned twenty six years previously Prolapse gradually increased in size

B—Dr S Prolapse reduced with difficulty Colostomy transferred to left inguinal region (Carcinoma of caecum also found and right hemicolectomy performed )

evacuations and worries the patient into the belief that malignant stenosis is occurring

Colostomy stenosis can be prevented by suturing the mucosa of the colon to the skin edges It can be corrected once it has developed by dividing the fibrous ring and suturing the mucosa to the divided skin

COLOSTOMY PROLAPSE —This is rarely so severe as to require special treatment minor prolapse may develop over a period of years but does not usually disturb the patient In the severe cases the colostomy may prolapse six inches or more and prove difficult to replace in these cases all layers of the colon prolapse and the only satisfactory treatment is to remake the colostomy stoma in a new position simple amputation of the prolapsing bowel is unsatisfactory (Fig 247)

COLOSTOMY HERNIA.—It is usual for some weakness to develop around the colostomy stoma and twelve months after the operation the colostomy often appears to be in the centre of a slight bulge in the abdominal wall These herniae usually have broad necks and are easily reducible in over 3 000 patients with colostomies at St Mark s Hospital there has been only one case of strangulation of a loop of ileum in a colostomy hernia

The incidence of this complication can be reduced by meticulous suturing of the abdominal musculature around the emerging bowel When the hernia appears the patient may be concerned about a recurrence of malignancy especially if it should increase in size Reassurance is necessary but active treatment is rarely required

COLOSTOMY BLEEDING.—It is not uncommon for a patient to observe a trace of blood on the motion or on the dressing which covers the colostomy It is not unreasonable for them to be concerned about this but in practically every case it is possible to demonstrate the source of the bleeding from granulation tissue at the edge of the stoma No special treatment is required

**Abdominal and Perineal Wounds**

ABDOMINAL WOUND.—Mild wound infection is not uncommon and although it may be deeply situated it is usually confined to tissues around the sutures A hernia may appear later but the incidence is no higher than with other wounds If chronic retention of urine is allowed to develop and the bladder becomes grossly distended complete wound disruption is likely

PERINEAL WOUND.—The skin incision usually heals by first intention and a fortnight after operation there is only a small sinus where the drainage tube was placed This may close over early but if a deep abscess should form as a result it usually discharges spontaneously There may be some discharge from this sinus for months and even a year or more particularly if the original tumour was large and the remaining cavity considerable In hirsute individuals tufts of hair may turn into the sinus and be responsible for a secondary type of pilonidal infection Rarely the perineal wound becomes the site of an incisional hernia a very large bulge develops and the overlying skin may become very thin Although this is an uncomfortable complication for the patient special treatment is not required and in any case operative intervention might be difficult and prove unsuccessful

**Pain**

The patient often complains of very severe and persistent discomfort in the perineal wound in the post operative period This is particularly so when the coccyx has been removed For this reason the manoeuvre should be avoided when dealing with tumours in the upper third of the rectum but for those nearer the coccyx a more radical excision is obtained after excision of that bone Pain developing a few months after the operation is ominous and very often means a perineal recurrence

## MODIFICATIONS OF THE STANDARD COMBINED ABDOMINO PERINEAL EXCISION OF THE RECTUM

### Previous Colostomy

A patient presenting with an acute large bowel obstruction caused by a carcinoma of the rectum will usually require a preliminary colostomy or caecostomy If a caecostomy is performed subsequent operation presents no problems If the sigmoid colon has been used to form an inguinal colostomy it is excised with the rectum An oblique incision should include the colostomy stoma and the operation then proceeds in the usual way If a transverse colostomy has been performed it is closed at the conclusion of the combined operation if the patient s condition is satisfactory

### Combined Excision of the Rectum including the Uterus

A hysterectomy should be performed if the tumour involves the uterus cervix or upper vagina No attempt should be made to dissect between the uterus and vagina and the rectum The incisions in the peritoneum on either side of the meso rectum are carried forwards to meet anterior to the uterus Both ovaries are included in the resection The ureter is traced forwards on both sides and the uterine artery secured as it crosses the ureter The vaginal wall may be divided from above or below whichever is the more convenient It may be difficult to reconstitute the peritoneum in the floor of the pelvis but by keeping the possibility of this difficulty in mind during the operation by extensive undermining of the peritoneum and by departing from the single straight midline suture in the pelvic peritoneum and replacing it with a T shaped suture line closure can nearly always be achieved

### Combined Excision of the Rectum Including the Posterior Wall of the Vagina

If the tumour is closely related to the recto vaginal septum the posterior wall of the vagina is excised with the rectum if the tumour is obviously invading the vagina a hysterectomy is also done

The anterior dissection is not done until the lateral dissections have been completed The posterior fornix of the vagina is incised just behind the uterine cervix The perineal dissection likewise does not extend upwards between the anal canal and vagina but is carried directly into the vagina so including the perineal body The incisions in the postero lateral corners of the vagina are carried upwards and meet in the posterior fornix There is considerable venous oozing from the cut wall of the vagina but this can be controlled by a continuous suture along the cut edge No attempt need be made to close the defect in the vaginal wall because it can be left open for drainage of the perineal wound per vagina whilst the perineal skin is completely closed

### Combined Excision of the Rectum Including the Seminal Vesicles

A tumour in the lower half of the rectum may be so closely related to the seminal vesicles as to make an attempt at separation inadvisable The anterior dissection can proceed anterior to the seminal vesicles without diffi

culty but special care must be taken to avoid the ureters which should be exposed to the points at which they enter the bladder The bladder wall immediately above the prostate is in real danger of perforation and if the surgeon is doubtful as to whether or not a hole has been made in the bladder he should ask his assistant to fill the bladder so that any leakage can be observed There is considerable venous oozing in the region but it can be controlled with pressure

**Combined Excision of the Rectum Including the Bladder Wall**

If the tumour is involving the bladder wall or prostate the surgeon should seriously consider their complete removal with the rectum and provide the patient with an artificial bladder as well as a colostomy In the writer s experience no case has required such drastic action because in the rare instances in which advanced local spread has been present peritoneal or hepatic metastases have rendered the prognosis quite hopeless

If however the tumour is so closely related to the bladder wall as to make it unwise to attempt separation the affected part of the bladder should be excised The dissection proceeds in the usual way and as much of the rectum freed as is possible without detaching the rectum from the bladder The ureters are traced to the bladder wall The bladder is then deliberately opened at the fundus and the bladder wall incised down to and around the adherent tumour It is then repaired by suturing in layers and a suprapubic catheter is left in place continuous bladder suction may be ordered for the post-operative period if the defect was large and the suture line is under some tension

**Combined Excision of the Rectum for Carcinoma Supervening on Ulcerative Colitis and Multiple Polyposis**

After completing the combined abdomino perineal excision of the rectum a decision must be made as to the feasibility of excising the remainder of the colon and constructing a permanent ileostomy at the same time Such a one stage operation serves to remove the whole of a potentially dangerous colon without delay and avoids the need for a second operation In the writer s experience primary one stage proctocolectomy is the procedure of choice as it is very well tolerated by the patient the operating time is reduced if there is an experienced perineal operator working synchronously with the abdominal surgeon

## ABDOMINAL RESECTION OF THE RECTUM WITH END TO END ANASTOMOSIS AND PRESERVATION OF THE ANAL SPHINCTERS (RESTORATIVE RESECTION)

In this procedure which is conducted through an abdominal incision the upper half of the rectum is excised with the lower sigmoid colon and the lower end of the proximal sigmoid colon is brought down and sutured to the upper cut end of the lower half of the rectum

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In this procedure which is conducted through an abdominal incision the upper half of the rectum is excised with the lower sigmoid colon and the lower end of the proximal sigmoid colon is brought down and sutured to the upper cut end of the lower half of the rectum

The earliest operations performed for carcinoma of the rectum were simple local removals and although the sphincters were preserved recurrence was almost inevitable Kraske commenced a new era in 1885 when he suggested that a more radical excision of the rectum could be obtained by improving the exposure of the operative field by removal of the lowermost pieces of the sacrum after excision of the part of the rectum containing the tumour either continuity was restored by suture or a sacral colostomy was established In 1932 Grey Turner related his experience with seventeen cases of posterior resection and anastomosis with preservation of the anal sphincter there were no serious operative complications and the function was excellent but he admitted that only about two per cent of patients presenting with a carcinoma possessed a tumour small enough to permit this procedure The operation is now rarely performed because the extent of resection is too limited and there may be great difficulty in approximating the upper segment to the rectal stump without tension

In 1892 Maunsell advised routine laparotomy to loosen the upper rectum and sigmoid colon from their attachments to the sacrum whilst Giordano and Quenu at about the same time found that this approach allowed better control of haemorrhage and wider excision of the affected glands Maunsell and later Weir (1901) discarded the sacral approach altogether and after excising the tumour from above restored continuity by invaginating the bowel through the anal sphincters In 1896 Tuttle advocated a combined operation utilising both abdominal and sacral approaches he performed an abdominal resection and then turned the patient on his side and performed the anastomosis through a sacral incision This operation is advocated by some leading surgeons of today notably Aylett of London (Aylett 1949)

When Miles introduced the combined abdomino-perineal excision of the rectum in 1908 he produced evidence of such convincing nature to support his view that the tumour spread laterally and downwards as well as upwards that he virtually put an end to procedures designed to preserve the levator ani and anal sphincters There is no question that in advanced cases of carcinoma of the rectum downward spread is a feature but such tumours are virtually incurable by any operation It was Westhues (1930) who showed the inaccuracy of Miles s arguments and he demonstrated conclusively that the spread is nearly always in an upward direction and that wide removal of tissue below the growth was not only unnecessary but unwarranted by the facts This stimulated a revival of the restorative procedures which has gained momentum in recent years Naunton Morgan (1955) reviewed a personal series of cases subjected to operation between 1948 and 1954 and reported that in 105 of 388 cases (twenty seven per cent) a restorative procedure was done

For tumours situated ten centimetres or more from the anus excision through an abdominal incision can be as radical as that obtained by the combined abdomino-perineal excision of the rectum Furthermore with the excellent relaxation obtainable with modern anaesthetics it has been found

quite feasible to anastomose the colon to the stump of the rectum by end to-end anastomosis at the same time and through the same incision although it often proves a difficult technical procedure Tumours below the ten centimetres level are within or almost within the lateral field of spread and although a radical excision can still be obtained and be compatible with an anastomosis performed in the same way the procedure is not advocated because it is felt that the Miles operation is less likely to result in local recurrence In special circumstances such as those arising when a patient refuses a colostomy the procedure may have to be performed but the technical difficulty of anastomosis is considerable In these circumstances the writer prefers anastomosis after invagination through the anal canal rather than through a post anal incision with removal of the coccyx and portion of the sacrum Surgeons who have tried the various methods have found that the convalescence after the latter procedure takes weeks longer than that after anterior resection and end to-end anastomosis or anterior resection and trans anal anastomosis

Many leading surgeons have expressed disapproval of this restorative resection but despite this the operation has gained in popularity and is regarded by the author as the procedure of choice for tumours in the upper third of the rectum Although Lloyd Davies (1948) found a local recurrence rate of nearly twenty five per cent in a series treated by anterior resection and anastomosis at St Mark s Hospital a similar incidence accompanies combined abdomino perineal excision of the rectum Local recurrence is not as easily detected after the rectum has been removed The possibility of implanting malignant cells in the tissues at the site of anastomosis is apparently a real one Vink (1954) demonstrated implantation of the Brown Pearce tumour of the rabbit into a colonic suture line in the same species whilst McGrew Laws and Warren Cole (1954) have found free malignant cells in the lumens of portions of colon resected for carcinoma Such a mechanism of recurrence can be lessened by irrigating the rectum with 1 500 perchloride of mercury during the operation (Morgan 1955) Experimental evidence suggests that the trauma of suturing the rectal stump might act as a stimulus to neoplastic transformation but this lacks confirmation On the whole figures indicate that a restorative excision is as effective as the abdomino perineal excision with permanent colostomy provided the tumour lies not closer than ten centimetres to the anus A small protuberant tumour of low grade histological activity occurring in a lean individual and situated as close as seven or eight centimetres to the anus might also be as effectively treated by a restorative excision

**Pre-operative Treatment for Anterior Resection of the Rectum with End to End Anastomosis**

The same treatment outlined for the combined abdomino perineal excision of the rectum is ordered for the patient Even though it is confidently antici pated that a restorative excision will be possible it is important that the patient

be told of the nature of a colostomy and that his permission be obtained to proceed to this step if the need arise In some patients the clinician will be deceived and what he thought to be a suitable case for restorative excision may prove at operation to be too extensive and requiring a permanent colostomy in others a temporary colostomy or caecostomy may be constructed at the conclusion of the operation in order to provide some protection to the anastomotic suture line

### *Preparation in Theatre Immediately Before Commencing Operation*

The same posture and the same preparation as that described for the combined excision is used The perineal end is not prepared at this stage but an angled self retaining tube is placed into the rectum During the operation the rectum is irrigated with 1 500 perchloride of mercury this can be done from a fluid container possessing a long rubber tube which can be passed down the angled catheter into the rectum

### Operation

A lower left paramedian incision is preferred to the oblique incision because of the better exposure obtained and this may prove vitally important in the performance of a good anastomosis The incision should extend from the pubis to a point two or three centimetres above the umbilicus

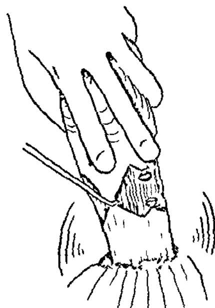


FIG 248
Anterior resection of carcinoma of rectum Rectum retracted forwards and superior haemorrhoidal vessels divided (short distance above levator ani muscle) and secured If not ligatured haemorrhage is brisk on account of collateral circulation through inferior haemorrhoidal vessels

The operation proceeds in the same way as described for the abdominal part of the combined excision of the rectum The pedicle containing the superior haemorrhoidal (or inferior mesenteric) vessels is ligated and divided above the left colic branch The incision in the mesentery should be planned so as to divide the marginal artery as low as possible in order to preserve the maximum length of sigmoid colon The marginal artery is divided early so that the surgeon can be certain of the line along which the bowel changes from the viable to the non viable

The peritoneum is divided alongside the meso-sigmoid and meso-rectum and the incisions curve to meet anterior to the rectum The anterior and then the posterior dissections are completed as far distally as possible The extra peritoneal tissue on the lateral side of the meso-sigmoid and meso-rectum and the lateral ligaments are divided The middle haemorrhoidal vessels are ligated The rectum will then be free down to the surface of the levator ani muscle

The rectum should be sectioned not less than five centimetres below the lower edge of the tumour and it is advisable to mark this level with a black ligature at this stage The superior haemorrhoidal vessels divide into numerous



FIG 249
Right angled clamp applied to rectum below tumour when performing anterior resection and anastomosis

branches which enter the walls of the rectum The branches are in two main groups right and left and it is usually possible and certainly desirable to secure them deep in the pelvis at the level of the proposed section of the rectum before this section is done (Fig 248) If this is not done profuse bleeding will take place because of the free anastomosis with the inferior haemorrhoidal vessels It is not uncommon to find a group of veins on the anterior aspect of the rectum on either side of the midline which will also need ligation before the rectum is divided

After the rectal stump has been prepared a right angled pedicle clamp is applied across the rectum at the site of the proposed section (Figs 249 250) Rectal stump irrigation with a solution of mercuric perchloride (1 500) is now commenced Morgan (1955) believes this has reduced the incidence of recurrence in the suture line from 21 4 to 2 08 per cent The irrigation must be done thoroughly and accordingly the surgeon should not become impatient He can occupy his attention by returning to the proposed site of division of the sigmoid colon Guy sutures (No 2/0 silk) are applied to the bowel just proximal to the line of demarcation separating the blue non viable colon from the pink viable bowel above These sutures should be placed on either side midway between the mesenteric and anti mesenteric borders A straight Kocher s

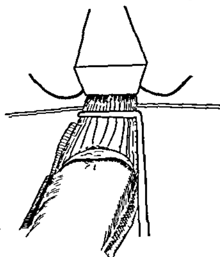


FIG 250
Anterior resection of carcinoma of rectum Right angled clamp placed at least five centimetres below tumour Two guy sutures in position on lower rectum support after bowel has been sectioned

clamp is applied and the colon divided just above it but below the guy sutures Faecal material presenting in the lumen is gently swabbed away and the bowel is covered with a pack whilst the surgeon returns to the distal end

A pack is placed behind the rectum down to the level of the levator ani and is left undisturbed until the anastomosis has been completed Guy sutures

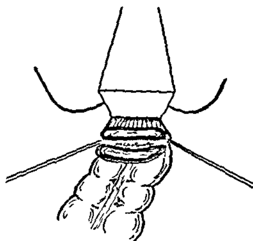


Fig 251

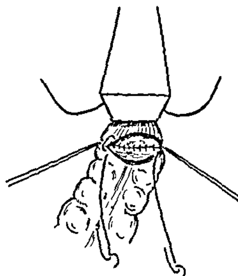


Fig 252

Fig 251—Anterior resection of carcinoma of rectum Posterior row of interrupted fine silk sutures placed in position and sutures tied

Fig 252—Anterior resection of carcinoma of rectum Inner layer of continuous 2/0 chromic catgut nearing completion An inverting stitch used for anterior half

(No 2/0 silk threaded on No 16 half-circle intestinal needles) are inserted on either side of the rectum one centimetre below the right angled clamp When the irrigation has been completed the rectum is divided any fluid remaining in the lumen is sucked out and bleeding vessels are secured and ligated

A series of interrupted fine silk ligatures (No 2/0) threaded on small half-circle intestinal needles (No 16) are now placed in position in such a way that when tied the posterior surfaces of the bowel are approximated (Fig 251) These ligatures penetrate deeply into the muscularis but not into the mucosa and should be inserted just less than one centimetre from the cut edge of the bowel There should be at least eight of these sutures and all should be in place before the first is tied When placing these sutures into the posterior wall of the rectal stump it is of considerable help to have the posterior wall held forward in a pair of Babcock s forceps

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FIG 253
Long toothed dissecting forceps useful for work deep in pelvis

The anastomosis is completed with a series of interrupted fine silk sutures threaded on half-circle intestinal needles and placed deeply in the muscle but avoiding *the mucosa of the bowel (Fig 253)*

The pack behind the rectum is now removed and haemostasis established Usually it is not possible to suture the pelvic peritoneum satisfactorily and no attempt should be made if it is possible the peritoneum should be sutured *behind* the sigmoid colon A drainage tube or sheet of corrugated rubber is inserted into the pelvis through the lower end of the incision The omentum is brought down from the upper abdomen and wrapped over the site of the anastomosis The abdomen is then closed in layers

Before the patient is removed from the operating table the anal sphincter is gently dilated to facilitate the passage of flatus post-operatively so relieving early tension on the suture line

### The Place of Colostomy or Caecostomy in Anterior Resection of the Rectum with End to End Anastomosis

Some surgeons are reluctant to do this operation unless about ten or fourteen days before the resection is done a transverse colostomy has been constructed The writer does not favour this course because complications without a colostomy are almost negligible provided that there is no tension on the anastomosis that the blood supply to both ends is liberal and that

clamp is applied and the colon divided just above it but below the guy sutures Faecal material presenting in the lumen is gently swabbed away and the bowel is covered with a pack whilst the surgeon returns to the distal end

A pack is placed behind the rectum down to the level of the levator ani and is left undisturbed until the anastomosis has been completed Guy sutures

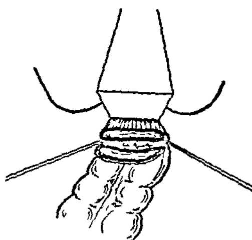


Fig 251

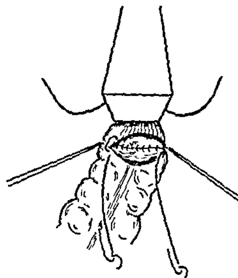


Fig 252

Fig 251 —*Anterior resection of carcinoma of rectum* Posterior row of interrupted fine silk sutures placed in position and sutures tied

Fig 252— *Anterior resection of carcinoma of rectum* Inner layer of continuous 2/0 chromic catgut nearing completion An inverting stitch used for anterior half

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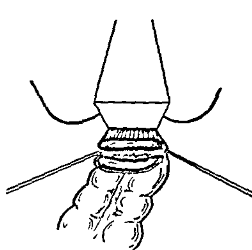


FIG 251

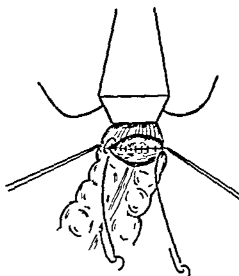


FIG 252

FIG 251—Anterior resection of carcinoma of rectum Posterior row of interrupted fine silk sutures placed in position and sutures tied

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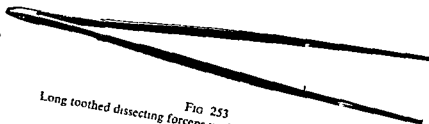


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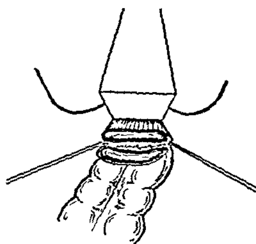


Fig 251

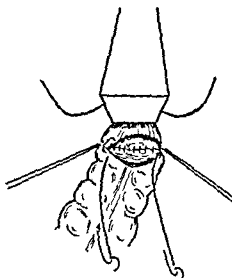


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**The Place of Colostomy or Caecostomy in Anterior Resection of the Rectum with End to End Anastomosis**

Some surgeons are reluctant to do this operation unless about ten or fourteen days before the resection is done a transverse colostomy has been constructed The writer does not favour this course because complications without a colostomy are almost negligible provided that there is no tension on the anastomosis that the blood supply to both ends is liberal and that

the technique has been meticulous Furthermore a transverse colostomy may prove a nuisance should the surgeon find that the sigmoid colon is very short and that in order to bring it down to the rectal stump it is necessary to liberate the descending colon and splenic flexure and the left half of the transverse colon

If for any reason the surgeon is dissatisfied with the anastomosis it might be wise to perform a transverse colostomy or a caecostomy at the conclusion of the operation of resection and anastomosis A caecostomy for a few days is a very useful procedure as it will offer some protection to the suture line and will close spontaneously shortly after removal of the tube

**Post-operative Treatment**

Anterior resection and end to-end anastomosis is very well tolerated by patients blood loss and shock are rarely troublesome despite an operation which may take as long as three hours to complete Omnopon or morphia are prescribed for pain and the patient is nursed in a comfortable position in bed

Nothing is permitted orally until the bowel sounds have returned and there is some evidence of active peristalsis as shown by the passage of flatus or a bowel action The fluid balance is maintained by intravenous therapy 2 000 cubic centimetres of five per cent dextrose water and 1 000 cubic centimetres of normal saline are given in each twenty four hour period after the operation Aspiration of the stomach is not necessary unless the patient commences vomiting

Penicillin and streptomycin are given in the first five days after the operation the drainage tube is shortened on the fifth day and is out by the seventh day A catheter is kept in the bladder until the intravenous infusion is discontinued which is usually about the third or fourth day The patient is allowed out of bed on the seventh post-operative day and to the bath on the tenth day after removing the sutures If a caecostomy tube has been placed in position it can be removed as soon as it is clear that the anastomosis has healed without infection and this is usually about the seventh or eighth day

## COMPLICATIONS OF RESTORATIVE RESECTION

**Infection**

If the anastomosis remains intact general peritonitis will not develop Localised infection around the site of anastomosis is probably usual but is rarely severe If an abscess does form it is often too small to detect clinically although its presence is appreciated by the persistent swinging pyrexia Such a temperature chart need not cause alarm because in most instances the abscess ultimately discharges spontaneously into the lumen of the bowel

**Faecal Fistula**

If the suture line breaks down a faecal fistula will develop If it appears in the first day or two after the operation it indicates faulty stitching if it develops a week or ten days after the operation it is due to a delayed break down of a portion of the anastomosis as a result of necrosis from excessive tension or inadequate blood supply If the faecal material appears early and especially if it is profuse in quantity a proximal colostomy should be done without delay but if the fistula develops only after a week or ten days no treatment is necessary even though the discharge is considerable because this will soon stop of its own accord

**Stricture**

The lumen of the rectum is so capacious that permanent stricture formation is most unusual Oedema at the site of the anastomosis often causes narrowing which may persist for some weeks and which may be responsible for soft and narrowed motions When felt on rectal examination it may cause some concern However it will correct itself spontaneously and some months after operation it may be difficult to feel the suture line at all Even when the suture line does break down and a segment heals by granulation tissue serious stricture formation requiring treatment is rare

**Function of the Rectum**

For the first few days after a restorative excision the patient is incontinent but towards the end of the first week the sphincter muscles recover their tonus sufficiently to stop a faecal discharge but some incontinence remains because the patient is uncertain when the bowels are going to act and reflex contraction of the sphincter muscle is absent The condition improves in two or three weeks and the patient becomes continent However special tests reveal a persistent loss of sensory discrimination within the rectum the patient is often unable to decide whether faeces or flatus need to be passed so that to avoid soiling the underclothes the toilet is visited on each occasion this accounts for most of those instances in which the patient claims that sphincter function is adequate but that it is necessary to open the bowels several times daily

## THE TREATMENT OF MALIGNANT RECTAL POLYP

A difficult situation arises when the surgeon removes an adenoma by local excision and the pathologist reports that it is malignant The extent of the local excision may have been perfectly adequate but the surgeon must decide whether or not the regional lymph nodes should be removed a procedure entailing laparotomy and either anterior resection and anastomosis or combined abdomino-perineal excision of the rectum with permanent colostomy

Lockhart Mummery and Cuthbert Dukes (1952) recognise six histological varieties of adenomata in so far as this problem is concerned (Fig 254) They further investigated the problem with special reference to surgical treatment

and their conclusions are similar to those reached by Fisher and Turnbull (1952) following an entirely independent research in Cleveland U S A



















Fig 254
Classification of rectal polyps according to Lockhart Mummery and Cuthbert Dukes (1952)

**No Radical Treatment Required**

1 *Carcinoma in situ* which represents an initial stage of malignancy there is no evidence of infiltration or invasion

2 A *focal carcinoma* implies a tumour almost completely confined to the region of the mucosa and is nearly always of low grade histological malignancy

3 *Invasive carcinoma* does not require further treatment if there is an adequately free margin clear of the tumour and provided the carcinoma is of low or average grade malignancy

If it is decided to observe the patient he should be warned of the necessity for remaining under close observation The surgeon should watch for local recurrence but should remember that in the series reported by Lockhart Mummery and Cuthbert Dukes (1952) enlargement of glands in the mesorectum was the first sign in one case indicating that more radical treatment was required

**Immediate Radical Excision Required**

1 'Focal carcinoma and invasive carcinoma of *high grade histological malignancy*

2 *Invasive carcinoma* of average grade malignancy if there is microscopical evidence of spread into the bowel wall or if the local removal has left only a small and inadequate margin of normal tissue around the malignant tumour

Consultation between the pathologist and surgeon should precede such an important decision

## COLOSTOMY AND MANAGEMENT

In 1710 Littre proposed the formation of an artificial anus by opening the colon above the site of an obstruction but it appears that a surgeon named Pillore of Rouen was the first to have accomplished a procedure of this nature when in 1776 he performed a caecostomy for a complete obstruction due to cancer of the rectum his patient lived twenty-eight days before dying from causes unrelated to the operation Sporadic reports of abdominal colostomies followed but after Amussat in 1839 demonstrated that he could perform a colostomy from behind without entering the peritoneal cavity the Littre operation fell into disuse The abdominal colostomy was revived at the end of the nineteenth century when it was realised that opening the peritoneal cavity did not increase the mortality and Amussat s lumbar colostomy was then discarded

The essential requirements of a colostomy have been appreciated for over fifty years It has been recognised that a colostomy must provide an effective outlet for faecal discharge it must be conveniently situated for the patient to manage and it must be neat and free from such complications as prolapse By careful technique by mucocutaneous suture and by placing the colostomy in the iliac fossa or in the midline each of these requirements has been largely satisfied

The chief problem has always been colostomy incontinence The uncontrolled escape of gas and faeces from the artificial anus has made the operation unpopular with both patients and surgeons and strenuous efforts have been made to overcome this difficulty

1 *Colostomy Plugs* —Weir over fifty years ago devised a double inflatable bulb one end of which fitted in the colostomy although such an apparatus has been re introduced it has not proved satisfactory because it is so uncomfortable to wear

2 *Colostomy Pouches* —Various appliances have been designed to catch faecal material after it has escaped from the colostomy Some have been constructed of metal (usually heavy and cumbersome) or of rubber (difficult to keep free from an unpleasant odour) whilst recently plastic disposable bags (Wagner Dispos I Pouches) have been placed on the market and have proved particularly successful (Fig 255)

3 *Surgical Procedures* —With the revival of the abdominal colostomy towards the end of the nineteenth century some ingenious procedures have been suggested and practised in the hope of securing control over colostomy function Gersuny rotated the intestinal loop and Tuttle attempted to make a sphincter by pleating the bowel so producing an aggregate of circular fibres at a point Howse brought the sigmoid colon through the fibres of the rectus abdominis Witzel Bailey Braun and others gave the terminal few inches of the colon an intramuscular or subcutaneous course

The author s colleagues Mr B K Rank F R C S and Mr Julian Orm Smith F R C S designed an improved permanent colostomy (Rank and Smith

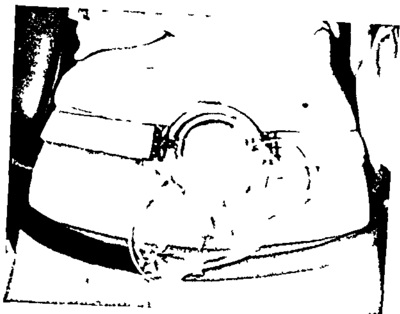


FIG 255
Disposable bag in position over a colostomy opening just below umbilicus



FIG 256
Combined excision of rectum with preservation of marginal artery so conserving an extra length of sigmoid colon

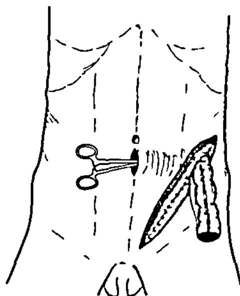


FIG 257
Small incision made just below umbilicus and sigmoid colon withdrawn through this so creating a subcutaneous course for terminal colon

1947) which entailed the construction of a tube of skin to the proximal end of which was attached the termination of the colon and into the lower end of which was inserted a specially designed plug With this colostomy they have had some excellent results

For certain cases the writer has revived in modified form an earlier procedure A long loop of sigmoid colon is fashioned by preserving the marginal artery (Fig 256) the colon is passed through the incision in the musculature in the left iliac fossa (permitting closure of the left lateral space) and is then carried under the skin to the midline below the umbilicus where it is brought through a small skin incision and sutured to the edges (Figs 257 258) The midline position of the stoma facilitates management and the wearing of an appliance whilst the passage of faeces along the subcutaneous part of the colon imparts a definite sensation to the patient and warns him of an impending bowel action This procedure is not possible in patients with a short loop of sigmoid colon (Figs 259 260)

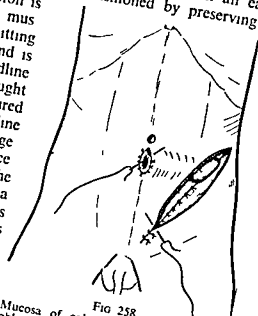


Fig 258
Mucosa of colon sutured to skin and oblique incision closed with interrupted sutures

4 *Colostomy Washouts*—Some surgeons prefer to control the colostomy by daily washouts through the colostomy stoma On rising in the morning the patient passes a soft rubber catheter into the colostomy stoma and runs one or two pints of water into the colon after a short interval the fluid returns bringing with it faecal accumulations from the colon If this is done correctly many of these patients have no colostomy action until it is washed out the next day The method is effective but cumbersome and is only advised when the more simple procedures fail

Some patients have found it a useful expediency to run in three or four ounces of water before breakfast they then fit a rubber bag over the stoma and have their meal and either during it or shortly after the colostomy acts the bag is emptied the patient has a shower and he may then remain free from trouble for the remainder of the day

## Management with Regular Diet and Colostomy Pouch

The author prefers to give the patient a trial on regular diet and colostomy pouches All patients are given a printed booklet explaining the colostomy and the difficulties to which it might give rise It is important that the surgeon takes the greatest interest in the colostomy and its function because embarrassing and frustrating incidents may arise during the first few months after

operation and these may cause considerable mental depression The patients should be given every assistance to overcome their disability and resume normal social and economic lives

The advice given to these patients is as follows Meals should be taken at absolutely regular hours It does not matter what times of the day are finally decided upon but once selected these times should not vary Breakfast at 8 a m lunch at 12 30 p m and dinner at 6 30 p m are the hours often chosen If the patient wishes to partake of nourishment between meals the times must again be absolutely identical each day If the patient eats the same foodstuffs each day and always at the same time within a few weeks he would find the colostomy acting at exactly the same time each day So much so that a few minutes before such an action is anticipated the patient can retire to the lavatory



FIG 259
Subcutaneous colostomy (Mr A sixty four years Carcinoma of anal canal Combined excision of rectum performed on 2nd February 1953 Died December 1955 from carcinoma of bladder thought to have been a further primary tumour)

"Naturally life would become monotonous if the same food had to be eaten each day But this is unnecessary because once regularity has been achieved variations in the diet can be permitted such variations must be introduced cautiously and any ill-effects noted For example some patients with colostomies find that pumpkin should be avoided but there is no harm in attempting a return to such a commodity later when the bowel may prove more accommodating Tomatoes rhubarb apples oranges cabbage lettuce onions and chocolate are foodstuffs which some have learnt to avoid

Once regular evacuations have been achieved it is surprising how little attention the patient need pay to his diet He must keep regular meal times and avoid certain foodstuffs which disagree with him but beyond this there are no restrictions Under this regime most patients have a colostomy action a short while after breakfast and then perhaps nothing appears until the next day at the same time Sometimes there is a very small action after lunch and after tea at night

If the patient leads a home life a little cotton wool smeared with petroleum jelly or lanoline may be placed over the colostomy and kept in place with a binder or underwear This will suffice to keep him comfortable When the colostomy acts the cotton wool is discarded and a new piece placed

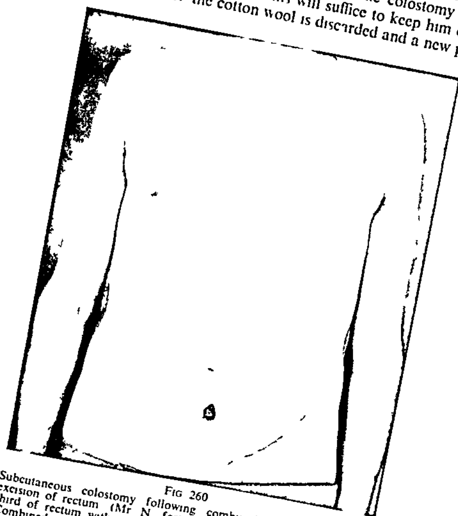


Fig 260

Subcutaneous colostomy following combined abdomino perineal excision of rectum (Mr N forty five years Carcinoma of upper third of rectum with secondary deposits in regional lymph nodes Combined excision of rectum on 19th March 1953 Died following local recurrence two years later)

in position and kept there by a binder The binder can be plain cloth held in place by safety pins or buttons or can take the form of an elastic belt or formal surgical belt much depends on the initial experiences of the patient The female patient often prefers to wear only a thin piece of cotton wool over the colostomy during the day

Many business persons and others who spend much of the day away from home find greater security in wearing a colostomy pouch or bag Colostomy pouches or bags are designed to fit over the colostomy opening and are held

in place by a belt The bag is applied before leaving home and can be left in place until the end of the day when it is removed and washed out or *discarded depending on the type of bag used* The selection of the bag and its fitting to the patient requires advice from the surgeon the patient should be very particular in the choice

By assiduously following simple dietetic common sense combined with a neat colostomy bag all but a very small minority of patients return to full work and enjoy practically normal social relations '

## ANTERIOR RESECTION WITH ABDOMINO ANAL ANASTOMOSIS

*If an anterior resection is performed and if the* rectal stump which remains is too short and too low in the pelvis to permit an anterior end to-end anastomosis the divided colon can be passed through the remaining rectum anal canal and anal orifice and after invaginating the rectal stump the end of the divided colon can be anastomosed to the proximal end of the rectum outside the anal canal and the anastomosis is finally pushed back into the pelvis The pelvis is drained through the lower end of the abdominal incision In the writer s experience sphincter function after this procedure has proved imperfect but adequate

## OTHER OPERATIONS FOR CARCINOMA OF THE RECTUM

Occasionally the surgeon will set out to do an anterior resection for carcinoma of the upper third of the rectum only to find the proximal colon grossly distended and loaded with inspissated faecal material It is not wise to proceed to anastomosis in these circumstances The excision can be completed in the normal way but the proximal colon should be brought out as a colostomy opening whilst the distal rectal stump is closed This operation known as Hartmann s operation can be followed by anastomosis of the colon to the rectum at a later stage (Fig 261)

In one case the writer performed an anterior resection with anastomosis through an incision in the posterior wall of the vagina This exposure permits anastomosis after resection of low lying tumours but holds no particular advantage over the abdomino anal method

## RESULTS OF TREATMENT OF CARCINOMA OF THE RECTUM

Few large series of untreated cases of *carcinoma of the* rectum have been studied but a notable exception is the work of Daland Welch and Nathanson (1936) They found that in 100 patients who did not receive treatment for various reasons the average *duration of life from the onset of symptoms* was fourteen months one patient was dead within a month of the onset of the illness whilst another lived for forty nine months In eighty cases with a palliative colostomy the average *duration of life* was the same and although one patient survived fifty six months most were dead within six months of

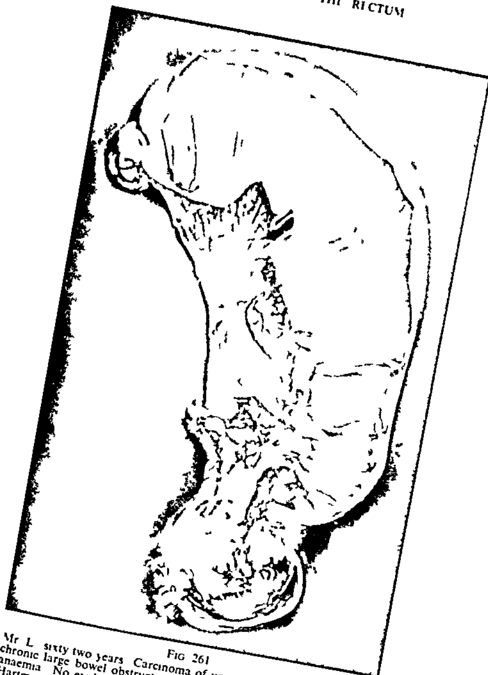


FIG 261

Mr L sixty two years Carcinoma of upper third of rectum causing chronic large bowel obstruction associated with severe hypochromic anaemia No evidence of spread beyond primary tumour Anterior Hartmann s resection performed because proximal colon too distended to permit satisfactory apposition of rectal stumps No sign of recurrence two years later Contented for colostomy to remain

the construction of the colostomy Coller and his associates (1952) found that about six per cent of patients with palliative colostomies will *survive two to five years*

## PALLIATIVE EXCISION FOR CARCINOMA OF THE RECTUM

The most satisfactory treatment for incurable cases of carcinoma of the rectum is palliative excision of the rectum with either a permanent colostomy or an end to-end anastomosis and preservation of the anal sphincter muscle The removal of the ulcerating mass in the rectum is the only way to prevent the unbelievable distress caused by the frequent bowel actions in the terminal stages A colostomy seems to increase discomfort although Daland Welch and Nathanson (1936) believed it to help

The writer has practised a palliative excision of the tumour wherever possible and has been gratified by the temporary improvement which in some cases is of an astonishing degree The least satisfactory cases are those with peritoneal metastases and in these the end usually comes within three to six months of the operation although some patients survive for a longer period In the early stages the patient is well but peritoneal metastases increase in size and intestinal obstruction ascites and abdominal masses necessitate increasing doses of pain relieving drugs but apart from occasional paracentesis of the abdomen there is nothing more that can be done for these individuals

If the peritoneum is free but metastases are present in the liver palliative excision might be followed by a relatively long survival and several of the writer s patients have remained in good health for several years despite large irregular livers In view of the longevity of survival in these cases no good purpose is served by telling the patient or often the relatives

## CURATIVE EXCISION FOR CARCINOMA OF THE RECTUM

In a number of patients laparotomy shows that the lesion is one that might be cured by radical excision In these cases Dukes (1948) has found that about fifty per cent were alive at the end of five years and most follow up studies have served to confirm these results Coller and his associates (1952) for example noted that fifty five per cent survived for five years but they noted that a number of patients will develop a recurrence between five and ten years after the operation They had not observed recurrence after this interval has elapsed

If the tumour is an early one and has no spread (Duke s A case) nearly eighty five per cent are alive and well after five years if the tumour is more advanced *with slightly greater local spread* survival falls to *63 9 per cent* (Duke s B group) whilst of those with lymph node involvement (Duke s C group) only 33 3 per cent are alive and well after five years The prognosis of tumours situated in the lower half of the rectum is not as favourable as those in the upper half (Ewing 1952) Tumours which *have a histological*

appearance indicative of low grade activity have a much better outlook than those in which poor differentiation suggests abnormal activity

TABLE XVI

SITE OF FATAL RECURRENCE IN 22 PATIENTS

| Site | |
|---|---|
| Perineum | 14 |
| Abdomen | 5 |
| Central nervous system | 2 |
| Lung | 1 |
| Total | 22 |

In none of the 22 patients in this table was there evidence of spread of the tumour at the time of the initial operation In each case an abdomino perineal excision of the rectum was performed

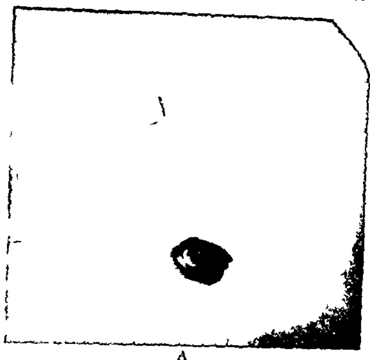
Coller and his associates have summarised the position by finding that of all patients with a carcinoma of the rectum seen for the first time fifty per cent are suitable for definitive treatment and thirty three per cent are alive and well in five years Of these patients in whom it is believed that a cure can be obtained by radical excision over one half survived five years and slightly less than a third reached the tenth anniversary



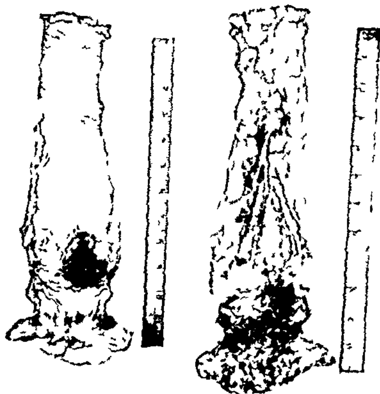
FIG 262
Perineal recurrence protruding from perineal scar with some ulceration

**Nature of Recurrence**

Following resections performed for apparently curable lesions recurrence is most frequently found deep in the pelvis whether an abdomino perineal excision of the rectum with permanent colostomy or an anterior resection with preservation of the sphincters has been done (Table XVI) Occasionally the recurrent neoplasm protrudes from the skin of the perineum (Fig 262) or can be felt on vaginal examination but usually in the initial stages and especially in the male it is neither seen nor felt but makes its presence known by causing a constant deep seated pain in the perineum which later becomes almost unbearable This is as common a mode of recurrence as that involving peritoneum or liver and



A



B C

FIG 263

*Recurrent malignant nodule alongside colostomy Mrs N., thirty three years Symptoms of twelve months duration Combined excision of rectum performed on 17th April 195_ Section showed average grade tumour dissection showed no glands involved Nodule excised on 3rd December 1952. (November 1956 alive without sign of recurrence )*

it is much more unfortunate because usually the patient retains reasonably good health and only gradually deteriorates as the persistent pain produces slow exhaustion (Fig 263)

**Treatment of Perineal Recurrence**

1 EXCISION —If the recurrence seems to be 'implantation in origin and is responsible for an isolated mobile mass it can be excised Such a recurrence may be found in the perineal wound or at the anastomotic suture line following a restorative resection in the latter case it will be necessary to perform an abdomino perineal excision of the remaining rectum in order to remove it

2 WANGENSTEEN S SECOND LOOK —Because of the frequency of perin eal recurrence the surgeon might be tempted to follow the advice of Wangen steen and his associates and perform an exploratory operation about six months after the initial resection in the hope of finding a resectable secondary tumour In thirty five cases in which this was done secondary malignancy was dis covered in fifteen cases (forty three per cent) but the results of resection of the recurrences have not been impressive (Wangensteen *et al* 1954)

3 DEEP X RAY THERAPY —Although these tumours are generally very resistant to irradiation it sometimes happens that this form of therapy produces some relief from the constant pain But very large doses are required and these might be above the skin tolerance dose for the area In general these cases are not satisfactory for deep X ray therapy or for other methods of irradiation

4 SACRAL INFILTRATION (by Russell Cole D A F F A R A C S) —The severe pain which accompanies perineal recurrences can sometimes be drama tically relieved by an extra thecal injection of absolute alcohol into the posterior sacral foramina of the second and third sacral segments and occasionally into those of the first and fourth Injections are made into one or two foramina on the same or opposite sides (Fig 264)

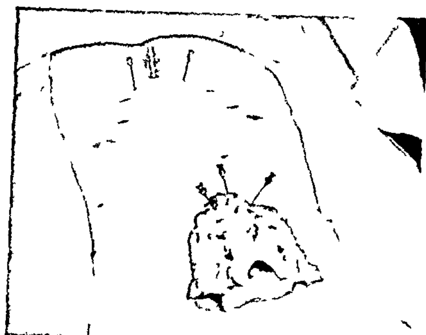
The patient is placed in a prone position with a pillow under the pelvis and the affected nerve root previously localised is injected with a short acting local anaesthetic such as xylocaine two per cent If the correct segment is injected the relief obtained is instantaneous Twenty four hours later the patient is placed in the same position and after receiving a sleep dose of thiopentone is given an injection of two or three cubic centimetres of absolute alcohol into the appropriate sacral foramen It is important that at least twenty four hours elapse between the injection of the local anaesthetic and the absolute alcohol otherwise there is a higher incidence of unsatisfactory results presumably because of the dilution of the alcohol A second injection of alcohol should not be given within a week of the first

There is often quite a severe neuralgic pain over the corresponding derma tone for a day or two Retention of urine is unusual unless both the second

and third sacral segments are given bilateral injections The best results are obtained in patients suffering from a well-defined pain fairly localised and without radiation down the leg



A



B

FIG 264

A—Disposition of needles in posterior sacral foramine
B—The injection

5 CORDOTOMY (by J Bryant Curtis MS FRCS FRACS)—Extra thecal sacral injection of alcohol may fail to relieve the pain If the patient s

condition shows no sign of early deterioration so that several months may elapse before the end and if the recurrence remains localised in the pelvis upper thoracic cordotomy should be considered

The fibres carrying the various types of sensation are sorted out in the spinal cord after leaving the posterior sensory root Those carrying pain and temperature cross to the opposite side of the cord and pass upwards in the lateral spinothalamic tract This crossing is gradual taking place over several segments The posterior border of the spinothalamic tract is at the denticulate ligament As fibres from upper segments cross those from the lower ones come to be arranged posteriorly so in general there is an orderly arrangement of sacral lumbar and thoracic segments from behind forwards commencing at the denticulate ligament The normal sensations arousing desires to micturate and defaecate pass up in the same segment of the cord

With the patient in the prone position and inclined at an angle of about sixty degrees to reduce bleeding an upper thoracic midline incision is made The laminae of the third and fourth thoracic vertebrae are removed as well as the lower part of the second if bilateral section is intended The denticulate ligaments are divided and whilst the ligament on one side is grasped and the cord rotated a cordotomy knife is introduced at a suitable bloodless point immediately anterior and adjacent to the denticulate ligament The knife is inserted at an angle of ten degrees to the transverse plane of the cord to a depth of 4 5 millimetres and is then moved round to leave the cord anterior to the point of emergence of the anterior nerve root If a bilateral operation is performed the second cut is made a segment lower The dura is closed tightly after haemostasis is assured and the muscles and skin are sutured in the usual manner The operation takes about one and a quarter hours to complete and although it may be accompanied by shock has a low mortality With bilateral cuts upset to bladder function is invariable but it is unusual for serious disorder to persist if the patient is given adequate training to overcome the difficulty associated with emptying

6 PREFRONTAL LEUCOTOMY —In cases where pain cannot be controlled by drugs but where the malignancy shows widespread dissemination or where the operative risk is very poor either on account of age or cachexia prefrontal leucotomy might give good relief of pain Pain is not abolished but it no longer worries the patient

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# SQUAMOUS CELL CARCINOMA OF THE ANUS AND ANAL CANAL

SQUAMOUS cell carcinomas of the anus and anal canal are uncommon tumours but they possess the same typical general features of similar neoplasms occurring in other parts of the body Their situation at the anal verge or in the anal canal introduces certain features of special importance in regard to treatment

## Surgical Pathology

The tumour is comparatively rare *In the author s series of 227 excisions* of the rectum for carcinoma there were eleven cases of epithelioma of the anus

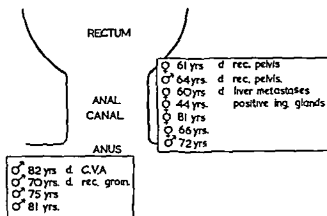



FIG 265
Summary of squamous cell carcinomas of anus and anal canal treated by author

or anal canal an incidence of 4 9 per cent Grinnell (1954) found an incidence of four per cent Sweet (1947) four per cent and Gabriel (1949) 3 35 per cent

In Gabriel s series the sexes were equally affected in Grinnell s forty *nine cases there were thirty one female patients* whilst in the author s smaller series of eleven cases there were seven male patients

SQUAMOUS CELL CARCINOMA OF THE ANUS —The tumour is seen commonly in elderly male patients (Fig 265) It is confined largely to the anal verge although it may extend into the anal canal The tumour has an ulcerated surface with raised everted edges (Figs 266 267) and as it increases in size tends to surround the anus There is considerable secondary infection which may be responsible for anal fistula formation The tumour frequently possesses a well-differentiated histological structure

SQUAMOUS CELL CARCINOMA OF THE ANAL CANAL —This tumour is seen most often in women (Fig 268) Occasionally the lower edge of the tumour

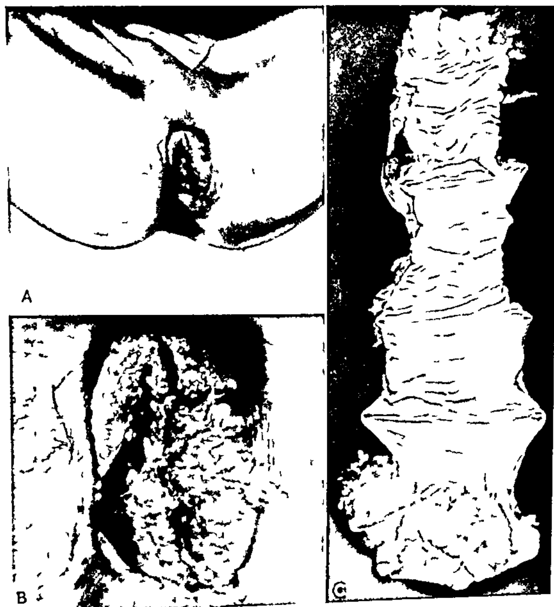



Fig 269

A—Carcinoma of anus (Mr M seventy one years Aware of lump increasing in size for six months Abdomino perineal excision of rectum performed on 17th November 1955 Convalescence uneventful )

B—Close up of tumour

C—Specimen after removal showing tumour spreading upwards to involve anal canal

is visible on inspection of the anus (Fig 269 A) The tumour ulcerates deeply and not uncommonly involves the vagina with fistula formation the ulcer also spreads around the anal canal and upwards into the rectum (Fig 269 B)

Microscopically the tumour tends to be poorly differentiated and sections often show a high degree of anaplasia This activity is one of the reasons why some of these tumours are quite small when they first cause symptoms (Fig 270)

Squamous cell carcinoma of the anus spreads to the regional inguinal glands if the tumour involves the anal canal the superior haemorrhoidal and middle haemorrhoidal glands may also be involved

INGUINAL LYMPH NODES —Metastases to the inguinal lymphatic glands have always been emphasised as important but there is difference of opinion

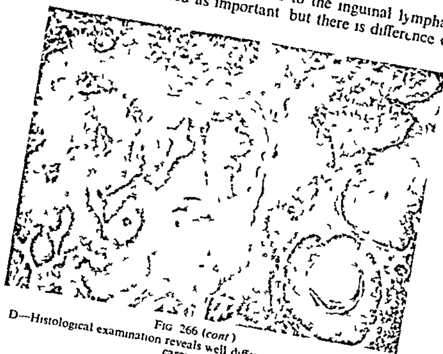


FIG 266 (*cont*)
D—Histological examination reveals well differentiated squamous cell carcinoma

as to the frequency with which they are affected In Grinnell's series of forty nine cases only four (8 2 per cent) had evidence of inguinal metastases Sweet (1947) noted that no fewer than sixteen of the twenty three patients dying from recurrent or metastatic disease showed positive inguinal nodes in three of the author's eleven patients lymph nodes were involved at the time of the initial operation

SUPERIOR HAEMORRHOIDAL LYMPH NODES —Upward spread along the superior haemorrhoidal lymphatics occurs less commonly than it does with carcinoma of the rectum but nevertheless Grinnell (1954) reports that it is found in just over twenty five per cent of cases Although affected glands are usually in the immediate neighbourhood of the tumour some are situated more remotely and can only be removed by a combined abdomino-perineal excision of the rectum

SQUAMOUS CELL CARCINOMA OF THE ANAL CANAL —This tumour is seen most often in women (Fig 268) Occasionally the lower edge of the tumour



FIG 266

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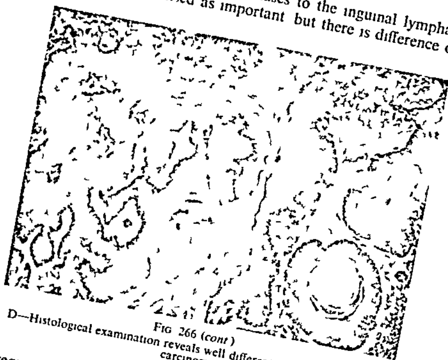


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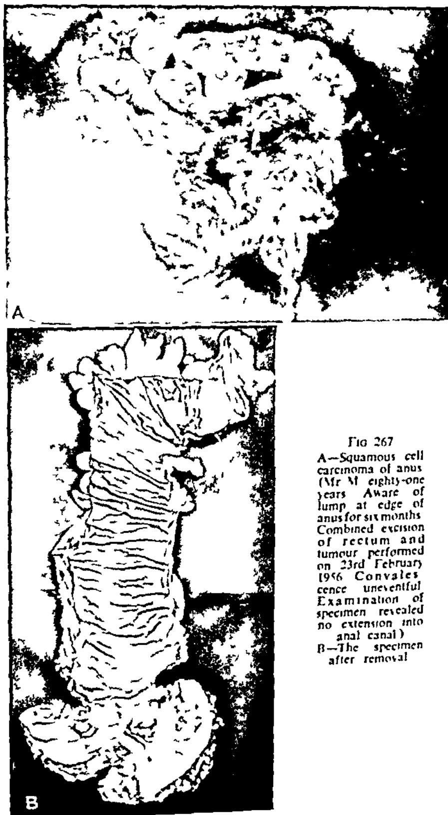



FIG 267

A—Squamous cell carcinoma of anus (Mr M eighty-one years Aware of lump at edge of anus for six months Combined excision of rectum and tumour performed on 23rd February 1956 Convalescence uneventful Examination of specimen revealed no extension into anal canal)

B—The specimen after removal

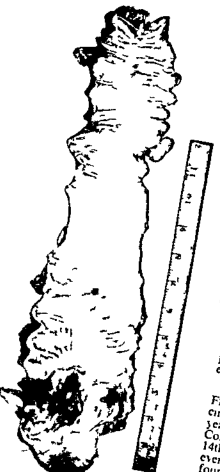


Fig 268




Fig 268—Carcinoma of anal canal (Mrs M sixty six years Blood in motions for three months Combined excision of rectum performed on 6th June 1952 Histological examination showed epidermoid carcinoma of high grade malignancy)

Fig 269 A—Edge of squamous cell carcinoma of anal canal (Mr B seventy two years Blood in motions for ten months Combined excision of rectum performed on 14th February 1956 Convalescence uneventful When specimen opened ulcer found to involve whole length of anal canal (Fig 269B))

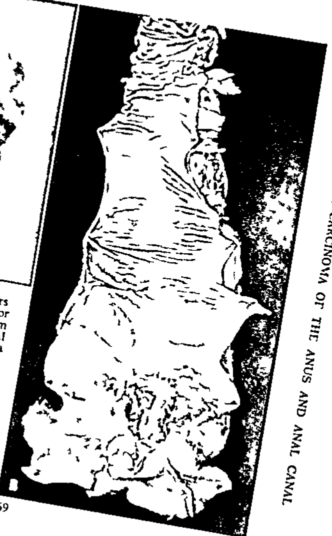
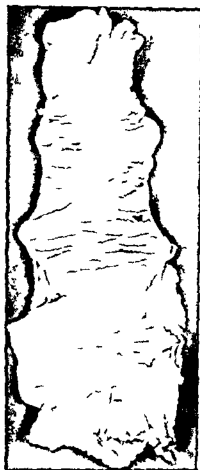


Fig 269

MIDDLE HAEMORRHOIDAL LYMPH NODES —*Squamous* cell tumours of the anal canal lie very close to the region drained by *the middle haemorrhoidal* lymphatic vessels In Grinnell s series of forty nine cases there was one with lateral spread only four with lateral and upward spread and a further case with involvement of *the lateral* glands in association with the superior haemorrhoidal and inguinal groups Grinnell suggests that this lateral spread might at least be as important as the upward spread Freidin (1955) also demonstrated this same lateral spread occurring with squamous cell tumours



A

FIG 270

A—Carcinoma of the anal canal with very small ulcerated surface (Mrs M sixty years increasing rectal discomfort of two months duration Combined excision of rectum and tumour performed on 21st December 1955 Extensive local and hepatic spread present Patient survived four months after operation)

Spread by the venous system appears to be much less common than is found with neoplasms originating within the rectum Both Sweet (1947) and Grinnell (1954) observed only the occasional case with liver metastases whilst secondary deposits in the lungs and bones were very rare

## Clinical Features

When the tumour is situated at the anal verge the chief symptom is the presence of a lump which bleeds easily When the lesion involves the anal canal pain is a prominent symptom The pain is constantly present and is aggravated by defaecation The patient nearly always notices blood with the motions and blood stained faecal discharges on the under clothes which become worse as the disease progressively destroys the anal sphincter

If the tumour is at the anal verge inspection leaves little doubt as to the diagnosis An ulcer with hard everted edges and friable necrotic base hardly needs a biopsy examination to confirm the diagnosis If the tumour is within the anal canal a digital examination will disclose the ulcerated area but such an examination often causes severe pain and endoscopic procedures may have to wait until the patient has been anaesthetised

## Differential Diagnosis

In most cases the diagnosis is not in doubt but occasionally a *condition is encountered* which is confused with an epithelioma of the anus or anal canal

NON SPECIFIC ULCER —A non specific ulcer may develop on the anal verge and involve the anal canal The cause of the condition is uncertain The lesion remains superficial despite its extent The edges are scarcely raised at all the floor is covered by clean granulation tissue whilst the base is not indurated Biopsy examination shows no evidence of neoplasm



B

FIG 270 *(cont)*

B—Histological examination reveals very poorly differentiated tumour

TUBERCULOUS ULCER —This is rarely seen It resembles the non specific ulcer but is more irregular in outline and the floor is covered by unhealthy tissue Biopsy discloses the diagnosis

DORSAL ANAL FISSURE —A long standing dorsal anal fissure may be confused with an epithelioma of the anus The position in the midline posteriorly the characteristic elliptical shape the white circular fibres crossing the floor and the sharply defined edges are typical of anal fissure

PRURITUS ANI —Chronic pruritus ani is often associated with grossly thickened and roughened perianal skin which may lead one to suspect that a carcinoma has developed Pruritus ani is usually associated with changes affecting most of the perianal skin and there is no evidence of deeper infiltra tion

ANAL CONDYLOMATA —Anal condylomata present as multiple tumours which surround the anus and extend into the lowermost part of the anal canal They vary in size from tiny elevations of the skin to fairly large pedunculated irregular masses with finely granular surfaces The individual tumours are dry and are not friable The multiple foci are separated by normal skin and

the absence of ulceration and evidence of invasion enable a diagnosis to be made on macroscopic appearances despite the alarming appearance of some of the more advanced cases (Fig 271)



FIG 271
Anal condylomata



FIG 272
Basal cell carcinoma of anus Second tumour seen anterior to anus Both tumours treated by local excision and primary skin graft to wound

ADENOCARCINOMA —A carcinoma arising in the lower third of the rectum may invade the anal canal and present as a fungating mass outside the anus (Fig 194) Such a tumour often shows evidence of mucous formation on its surface but a final diagnosis can be made only on biopsy examination The differentiation is not particularly important from the point of view of treatment because the principles of treatment are the same

BASAL CELL CARCINOMA —These tumours are rare in this region Most of the reported cases have been seen in the neighbourhood of the anus without actually involving it (Fig 272) The tumour is circumscribed superficial and mobile Despite a long history the ulcer remains small

MALIGNANT MELANOMA —This tumour also simulates a thrombosed internal haemorrhoid (Raven 1948) when examined it is hard and relatively non tender on palpation The surface is pigmented as well as ulcerated whilst biopsy examination indicates the true nature of the tumour

## TREATMENT

Surgical excision is the treatment of choice Radiotherapy is a popular method of treatment but it cannot be relied upon to destroy lymph node metastases especially those situated in the meso rectum It is a particularly painful form of treatment with unsatisfactory end results many of the patients so treated require a colostomy to relieve the agony associated with defaecation whilst the recurrence rate is high As the result of the development of surgery in recent years few patients need be refused surgery on the grounds of poor general condition or because of wide extent of the tumour

### Treatment of Squamous Cell Carcinoma of the Anus

Adequate local removal of these tumours will require excision of portion of the anal canal and of the sphincter muscle and usually to such an extent as to require a permanent colostomy on account of incontinence Therefore with the exception of small tumours situated at some distance from the anus an abdomino perineal resection is required It is doubtful if these tumours metastasise to the superior and middle haemorrhoidal lymph glands unless there is direct invasion of the anal canal

### Treatment of Squamous Cell Carcinoma of the Anal Canal

The surgical treatment of these tumours entails combined abdomino perineal excision of the rectum The superior haemorrhoidal lymph glands are removed with the rectum and the surgeon should excise as much of the pelvic fascia as possible in the hope of securing all potential metasases in the lateral field of spread The glands along the common iliac and along the external and internal iliac vessels are removed in the course of the abdominal dissection

REMOVAL OF THE INGUINAL LYMPH GLANDS —Some surgeons do not think that these glands should be dissected unless there is clinical evidence of their involvement However in the author s opinion a prophylactic dis section should be done because of the high incidence of metastases in these glands and because of the great suffering caused by malignant infiltration in the groin Neoplastic tissue ulcerates through the skin the femoral vein

becomes obstructed with massive oedema of the leg the femoral nerve is invaded causing severe pain whilst episodes of secondary haemorrhage add to the patient s misery

The glands can be removed at the time of the excision of the primary tumour but this is an extensive procedure taking three or four hours to complete and should not be undertaken unless the patient s condition is quite satisfactory The perineal excision is extended into the inguinal region and the inguinal glands are removed en bloc with the primary tumour If the patient *is not able to withstand this extended one stage operation the glands should* be removed about two or three weeks after the initial operation

*Technique of Removal of the Inguinal Nodes en Bloc with the Primary Tumour*—The incision in the perineum is extended by straight incisions into *the* inguinal region and continued to the anterior superior iliac spines These extensions should be placed just distal to the groove demarcating the thigh from the perineum The dissections can be performed synchronously The skin flaps are dissected up as thinly as possible to expose the fatty tissue containing the inguinal nodes The area exposed should extend from the inguinal ligament to a distance of about seven or eight centimetres down the leg At the periphery of this mass of tissue the dissection is deepened down to and then through the deep fascia so exposing the iliacus psoas and pec tineus muscles At the lowest limit of the dissection the long saphenous vein will be identified and ligated This block of tissue together with the deep fascia is lifted off the underlying muscles and the femoral vessels all the fatty tissue and nodes in the femoral canal are included until finally the specimen remains attached by the termination of the long saphenous vein into the femoral vein and by tissue continuous with the anus The former attach ment is severed between ligatures and the mass of tissue removed with the anal canal and rectum The glands along the iliac vessels are removed during the course of the abdominal dissection conducted in the combined excision

## Results of Treatment of Epithelioma of the Anus and Anal Canal

Grinnell (1954) in his review of the results of treatment found that they compared favourably with those for carcinomas of the rectum There was a five year survival rate of 36 8 per cent and a five year clinical cure rate of 36 1 per cent The author s experience has not been so satisfactory The ana plastic nature of the anal canal tumours and the age incidence of those occur ring at the anus is responsible for very few three or five year survivals

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# HISTORICAL APPENDIX

## ARDERNE, John

John Arderne was born in England in about 1306 He studied at Mont pellier and served in the Hundred Years War as a military surgeon under the Dukes of Lancaster and successively at Antwerp Algeciras in Spain and in Aquitaine He practised in France and later went to Newark where he practised for twenty years In 1370 he went to London where he was admitted to the Fraternity of Surgeons

Working chiefly among the higher classes he was a sound practical surgeon using the best practices of his day He revived the operation for the cure of fistula which had fallen into disuse for nearly 500 years His various treatises on the practice of medicine and surgery haemorrhoids and fistula in ano were written in Latin in his own hand English translations were published at various times and the treatise on fistula printed in abridged form in 1588

It is not certain when he died but it is believed to have been about 1380 to 1390

## DENONVILLIERS Charles Pierre D

Charles Pierre D Denonvilliers the famous Parisian anatomist and surgeon was born in Paris on the 4th February 1808 He studied medicine from 1836 and became a Doctor in 1837 He applied four times for the post of Dissector in Anatomy and became Associate Professor in 1839 He was appointed Surgeon to the Central Bureau of Hospitals in 1840 and Chief of Anatomical Works in 1841 He was chief of the School of Practical Anatomy of the Hotel Dieu in 1842 and succeeded Malgaigne as Professor of Surgery in this hospital in 1856

From 1833 he conducted almost without interruption courses in Descrip tive and Surgical Anatomy as well as in surgical technique and was appointed to the Chair of Anatomy in 1849 after the death of Breschet having prior to this enriched the Museum of the Faculty by his many beautiful and excellently fixed preparations and also having made the effort to introduce more order and cleanliness in the preparation rooms

His anatomy lectures were outstandingly clear and concise Although he was an excellent operator excelling particularly in plastic operations he was little known to the public because he did not seek private practice He wrote a number of books and articles and in 1858 was promoted to the post of General Inspector for Public Instruction in Medicine and to the important Superior Council which gave him the opportunity to take part in the efforts to improve medical teaching

Domestic misfortunes clouded the last years of his life until his sudden death in Paris on the 5th July 1872

**GEROTA, Dumitru**

Dumitru Gerota was born on the 17th July 1867, at Craiova Roumania He was Professor of Surgery at the University of Bucharest He studied lymphatics by the injection method and contributed to our knowledge of the lymphatic drainage and the lymphatic glands He died in May 1939

**HILTON, John (Fig 273)**

John Hilton was born at Castle Hedingham in Essex on the 22nd September 1805 He was educated at Chelmsford and Boulogne and entered Guy s Hospital in 1824



Fig 273
John Hilton

He became a Member of the Royal College of Surgeons on the 22nd May 1827 and was elected a Fellow of the Royal Society on the 16th January 1839 and a Fellow of the Royal College of Surgeons on the 11th December 1843

He was appointed Demonstrator in Anatomy at Guy s Hospital in 1844 and became Demonstrator in Anatomy to Bransby Cooper He was appointed Lecturer in Anatomy in 1945 and Full Surgeon in 1849 He served as a Member of the Council of the Royal College of Surgeons from 1854 until 1878 he was Hunterian Professor of Human Anatomy and Surgery at the College from 1859 until 1862 a Member of the Court of Examiners from 1865 until 1875 and a Member of the Board of Examiners in Dental Surgery from 1868 until 1875 He was Hunterian Orator and President in 1867

He became Surgeon Extraordinary to Queen Victoria in 1871 and President of the Pathological Society in that year He wrote Rest and Pain in 1862 He died at Clapham London on the 14th September 1878

**HOUSTON John**

John Houston was born in Northern Ireland in 1802 He was a physician at the City of Dublin Hospital and Lecturer in Surgery at Dublin He died there on the 30th July 1845

## MIKULICZ-Radecki, Johann Von

He was born on the 16th May 1850 in Bukovina, then part of Austro-Hungary. He studied under Hyrtl, Rokitansky, Hebra and Billroth. He [illegible] piano and organ lessons from 5 a.m. until 8 a.m. to earn the money to complete his medical course.

He graduated in 1875 and became assistant to Billroth. In [illegible] he was appointed to the Chair of Surgery at the University of Cracow. In [illegible] he went to the Breslau Clinic. In December 1904 he found that he was suffering from an inoperable carcinoma of the stomach and died on the [illegible] June 1905 at the age of fifty five.




Fig. 274
John Baptist Morgagni
(Portrait by [illegible] 1719. Facsimile [illegible]graph from Archives of the Royal Society.)

## MORGAGNI, John Baptist (Fig. 274)

John Baptist Morgagni belonged to the Italian School. He was born on the 25th February 1682 at Forli in *Romagna*, capital of a little Papal state south-east of Bologna at the foot of the Appenines.

His father died whilst he was a child, but his mother devoted her life to the education of her gifted son. At the age of fifteen he began to study medicine under Albertini and Valsalva, making his way with singular success

In 1701 he took the degrees of M D and Philosophy There followed a time as President of an independent school and a visit to the schools of Venice and Padua However he was forced to give up his studies for some time because of his health

In 1715 he was elevated to the Chair of Anatomy at Padua one of the highest positions in the world as a medical teacher and which he held for fifty nine years Anatomy was his first study and the part of science which he liked best He revised anatomy and corrected many errors made by his predecessors He founded the study of Pathological Anatomy and wrote a number of books His first essays were issued in his twenty fifth year and his famous *Seats and Causes of Disease* he finished in the year 1763 at the age of eighty three He became a Fellow of the Royal Society in 1724 and was similarly honoured in Paris St Petersburg and Berlin He died in Padua in 1771

## PROUST, P T

Proust described the retro vesical pouch in his doctoral thesis *Sur le Peritonite* published in Paris in 1822

## THIERSCH, Karl

Karl Thiersch was born in Munich After studying at Berlin Vienna and Paris he obtained his medical degree at the University of Munich In 1850 he took part in the war between Prussia and Denmark serving under the great orthopaedic surgeon Stromeyer whose teaching and example had much influence on him

After the war had finished he was appointed Professor of Surgery at the University of Erlangen a post which he held for thirteen years In 1857 he was transferred to the Chair of Surgery at Leipzig which he held for twenty eight years During the Franco-Prussian war of 1870 he was made Consulting Surgeon to the 12th Army Corps

Professor Thiersch made comparatively few contributions to surgery but his name lives as the inventor of the Thiersch graft which he described at a meeting of the German Surgical Society in 1874

He had a considerable reputation as a practical surgeon He was an early follower of the antiseptic method of Lister He died at Leipzig at the age of seventy three

## WALDEYER Hartz, Heinrich Wilhelm Gottfried von (Fig 275)

He was born on the 6th October 1836 at the village of Hehlen in Brunswick He took up the study of science and mathematics in Gottingen but switched over under the influence of the anatomist Henle to Medicine which he studied in Gottingen Greifswald and Berlin

He graduated in Berlin in 1861 and in 1862 became Assistant at the Physiology Institute in Konigsberg (capital of East Prussia at present incorporated in the Soviet Union under the name of Kaliningrad) and in 1864 obtained a higher degree in anatomy and physiology at the University of Breslau where he became Associate Professor of Pathological Anatomy in 1865 and Ordinary Professor in 1867



FIG 275
Heinrich Wilhelm Gottfried van Waldeyer Hartz
(Reprod d b p rm n fr m G rrison F H (1929) Hi to y of M l c Lond n Saunders )

In 1872 his wish to be able to turn exclusively to the study of normal anatomy came good with the appointment to that chair at Strassburg He was active in a similar capacity from 1883 to 1917 in Berlin where he achieved great credit for the efforts he made in the extension of the Anatomy Institute

Waldeyer who enjoyed the unquestionable reputation of an academic teacher and research worker worked mainly on comparative anatomy embryology microscopic macroscopic-systemic and topographic anatomy and anthropology apart from his pathological anatomical publications

He won great credit for his work on anatomy and developmental history He enriched the terminology with such new scientific terms as chromosome neurone etc He investigated the anatomy and physiology of the sex glands He died in Berlin on the 23rd January 1921

**MILES, William Ernest** (Fig 276) (M R C S 30/7/1891 F R C S 8/2/1894 L R C P 1891 T D Hon F A C S 1930 Hon F R C S I 1934)

William Ernest Miles was born on 15th January 1869 in Trinidad and educated at Queen s Royal College *Port of Spain* of which his father



Fig 276
William Ernest Miles

William Miles B A Oxford J P was headmaster He took his clinical training at St Bartholomew s Hospital where he served as demonstrator of anatomy and was then house surgeon at the Radcliffe Infirmary Oxford and at the Metropolitan Hospital London and St Mark s Hospital for Diseases of the Rectum under David Goodsall Miles was appointed assistant surgeon at the Royal Cancer Hospital in 1899 and became surgeon in 1903 and eventually consulting surgeon with his colleague Sir Charles Ryall he did

much to raise the prestige of the hospital and establish a tradition of first class surgery there

He was particularly interested in the surgical treatment of carcinoma of the large intestine and rectum and after prolonged anatomical and pathological research into the mode of spread of cancer of these organs he introduced in 1907 the abdomino perineal operation known by his name which revolutionised this branch of surgery and established his reputation as a supreme scientific and operative surgeon in his chosen field He clarified the pathological anatomy of haemorrhoids by emphasising the distribution of the superior haemorrhoidal vessels while his complex classification of fistulae revivified the work of Peter Thompson and inspired that of E T C Milligan F R C S and C Naunton Morgan F R C S

Miles paid much attention to the training of his assistants many of whom rose to distinction and he perfected the team work and technique in his theatre so that without any appearance of hurry everything went forward with the utmost speed and smoothness Miles devoted much time and work to the Gordon Hospital for Diseases of the Rectum both as a surgeon and in promoting its development from a small collection of converted houses to an up to date special hospital He was also consulting surgeon to the Royal Hospital Richmond and the West Hertfordshire Hospital

He was a keen territorial soldier and won the Territorial Decoration On the outbreak of war in 1914 he went to France with the British Expeditionary Force and held a number of military appointments

Miles contributed to the professional societies several important records of his work particularly to the annual meeting of the British Medical Association in 1910 and to the Medical Society of London in 1923 where his Lettsomian lectures surveyed the whole problem of rectal cancer He served as president of the sub section on proctology in the Royal Society of Medicine He was an Honorary Fellow of the Royal College of Surgeons in Ireland and of the American Proctological Society and a foreign associate of the French Academy of Surgery He served on the National Radium Commission and the executive committee of the British Empire Cancer Campaign He was the defendant in a legal action brought against him in 1930 for negligence in an operation although he could have claimed the technical protection that the action was brought more than seven years after the alleged negligent act he preferred to defend his reputation by contesting the action and was successful He had a very large private practice

Miles was a keen player of games excelling at tennis in his younger days and later in golf Horse racing was his chief amusement and he liked to entertain colleagues and old patients in his box at Ascot A man of real originality of mind he was also possessed of uncompromising drive and perseverance and was somewhat irascible but a staunch friend He died at 106 Hallam Street London on the 24th September 1947

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# AUTHOR INDEX

Abel L A 216
Aeginata Paulus 69
Allingham W 35
Arderne John 69 70 127 163 20_ 287 (Hist App)
Aronsson H 65
Aylett S O 254

Bacon H E 19 62
Bargen J A ?04 215
Barringer P L _15
Bloodgood J C 2_7
Bolton John 185
Broders A C 209
Brossy J J 5 176
Bussey H J R 219
Butler E C B 161 165 170

Clogg H S 2_7
Cohn I 165
Cole Warren H 255
Coller F A 270 271
Colles William 127
Courtney H 57

Daland E M 268
Denonvilliers C P D 287 (Hist App)
De Peyster F A 217
Devine H B 227
Dockerty M D 212 215
Dukes Cuthbert E 187 198 204 205 208 212 215 216 219 225 261 262 270
Dunphy J E 165

Ellis G V 7
Ewing M 3 187 270

Ferguson Lees 177
Fisher E R 262
Frankfeldt F M 197
Freidin J 14 19 212 214 282

Gabriel W B 85 102 135 164 165 170 219 226 249 277
Galley A H 197
Gask G E 19
Gerota Dumitru _88 (Hist App)
Gilchrist R K 217
Gleadell L W 166
Goligher J C 5 14 20 21 249
Goodsall D H 79 122
Gorsch R V 8 12
Grace W J 186
Graham Roscoe 164
*Grey Turner G* 254
Grinnell R S 211 277 279 282 ?86

Haworth J C 104
Hilton John ?88 (Hist App)
Hodges R M 104
Holmes T 187

Houston John 288 (Hist App)
Hueston J T 104

King E S J 104
Kirschner M 227
Knight C D 212
Kohlrausch O 7

Lane J R 116
Laws J F 255
Leacock A G 5
Lisfranc J L 226
Littre A 263
Lloyd Davies O V 35 165 227 249 255
Lockhart Mummery *H E* 262
Lockhart Mummery J P 20 64 147 164 226
Lumb G 182

Maunsell H W 254
Mikulicz Radecki J 164 170 289 (Hist App)
Miles W E 64 120 154 164 292 (Hist App)
Milligan E T C 5 7 23 33 82 152
Morgagni *J B 164 289 (Hist App)*
Morgan C Naunton 5 7 33 93 254 257
Moschowitz A V 164 165
Moutier F 197
Muir E G 160 164 165 170
McCann F J 165
MacDougall I P M 204
McGrew E A 255

Nathanson I 268
Neve C R 161
*Nevin R W 223*
Norbury L E C 35

Patey D H 104
Pillore H 263
Power Sir D Arcy 102
Protheroe R H B 182
Proust P T 290 (Hist App)

Quenu E 254

Rank B K 263
Raven R W 103 285
Robertson C T 249
Ross J P 19

Salmon F 164
Sauer I 19
Scarff R W 104
Smith J Orm 263
Stopford J S B 19
Stroud B B 3
Sudeck P 14 15
Sunderland D A 215 216
Sweet R H 277 279 282

Telford E D., 19
*Thiersch Karl 164* 290 (*Hist App*)
Thorgerson E., 102
Turnbull R B., 262
Turner John 166
Turell R 62
Tuttle J P 254 263

Vicary Thomas 163
Vink M 255

Waldeyer Hartz H W G 290 (Hist App)
Wallis F., 177
Walls E W., 4
*Wangensteen O H* 273
Warren R 204
Watson P C., 248
*Waugh J M.*, 212, 215
Weir R F., 254 263
Welch C E 268
Westhues H., 254
Wheelock F C 204
Williams D I., 248
Willis, R A., 187
*Wiseman J., 164*
Wolf A., 186
Woolff H G 186
Woollard H H., 111
Wright R D., 85
Wright A Dickson 138 154

Zachary R B., 104
Zetzel L. 204

# SUBJECT INDEX


ABDOMINAL (RESTORATIVE) RESECTION RECTUM 253
Abdomino anal anastomosis adenoma rectum 197
carcinoma rectum 268
villous tumour 190
Abdomino perineal excision rectum carcinoma 226
abdominal dissection in 231
construction colostomy in 238
history of 226
perineal dissection in 240
pre operative treatment of 228
preparation in theatre for 231
selection of cases for 228
Abscess anal anal fistula and 65 70
following injection haemorrhoids 138
perianal injection 122
Abscess ano rectal aetiology 55
bacteriology 56
classification 56
one stage operation 62
two stage operation 64
antibiotics in treatment 65
deep post anal 57
treatment 66
drainage tube in 65
ischio rectal 56
treatment of 66
pelvi rectal 58
perianal 56
treatment of 62
submucous 58
treatment of 66
Absolute alcohol sacral infiltration with 273
Adenocarcinoma rectum 208
Adenoma rectum 191
diagnosis 196
malignant 205
pathology of 192
signs of 195
symptoms of 194
treatment of 196
Adhesions following excision of rectum 249
Amoebic granuloma 223
*Anaesthesia general airway in* 50
dentures in 50 51
diathermy and 53
intubation in 51 52 53
position arms during 53
relaxant in 50 52 53
resuscitation and 51 52 54
sphincter contraction and 51
technique of 50 51 52
Anal canal anatomy 2 7
ano rectal ring and 2 31 34
columns of Morgagni 2
crypts of Morgagni 2
mucosa in 2 129 133
musculature in 4
submucosal veins in 129
Anal canal—*cont*
fibrous polyp 199
squamous cell carcinoma of 277
clinical features of 282
diagnosis in 282
incidence of 277
pathology of 278
results treatment of 285
treatment of 286
stenosis of 148
treatment 148
Anal condylomata 283
fissure (*see* Fissure anal) 114
fistula (*see* Fistula anal) 68
glands 4 55
groove 3 31 130
haematoma 23 151
intermuscular septum 7
organ 111
orifice 1
papillae 3
stenosis 114
valves 2
verge 1
Anastomosis technique in restorative resection 257
Ano rectal fistula (*see* Ischio rectal anal fistula) 73
Ano rectal ring 2 7 31 34
relation to fistula 73 78 82 83 91
Ano rectal suppuration (*see* Abscess) 55
Anterior resection rectum for adenoma 196
carcinoma 253
villous tumour 190
Anterior wall prolapse rectum 161 163 171
Anus anatomy 1
squamous cell carcinoma 277
clinical features of 282
diagnosis of 282
incidence of 277
pathology of 277
results of treatment of 286
treatment of 285
Aperture pelvic 10 158
enlargement of 160
*Apocrine glands* 111
Apolinose 69
Artery inferior haemorrhoidal 15
inferior mesenteric 13
internal pudendal 15 16
left colic 13 14
middle haemorrhoidal 14
middle sacral 16
sigmoidal 13 14
superior haemorrhoidal 13
superior vesicular 16

BARIUM CLYSMA IN CARCINOMA RECTUM 219
in proctocolitis 184
Basal cell carcinoma diagnosis from epithelioma anus 285

Benign tumours rectum (*see* Rectum benign tumours) 187
Biopsy diagnostic 41
  in carcinoma rectum 219
Bladder alteration of position after removing rectum 248
  excision with rectum 253
  fistula 247 253
  management after excision rectum 245
Bleeding from colostomy 251
Blind fistula external 72
  internal 72
Bowel habit alteration in carcinoma rectum 218
    haemorrhoids 133
    prolapse rectum 161
    villous tumour 189

CACHEXIA IN CARCINOMA RECTUM 221
Caecostomy in restorative resection rectum 259
Carcinoma anus and anal canal (*see* Anus and anal canal) 277
  in situ 262
  rectum (*see* Rectum) 202
  simplex 208
Clamp right angled 257
Clysma barium in carcinoma rectum 219
  in proctocolitis 184
Coccyx removal of in excision of rectum 241
Colitis ulcerative 180
Colloid carcinoma 208
  prognosis of 211
Colonic sensation 20
Colostomy control diet in 265
  plugs in 263
  pouches in 263
  surgery in 263
  washouts in 265
Colostomy inguinal closure lateral space in 238
    construction of 239
  lumbar 263
  management 263
    early 246
  palliative 225
    survival with 268
  perineal 226
  permanent 226
    pouches in 263 264 267
    pre-operative discussion concerning 229
    requirements of 263
  place in restorative resection 259
  sacral 226
  subcutaneous 265
Complete prolapse of rectum aetiology of 160
  diagnosis of 163
  incidence of 160 161
  signs in 162
  strangulation of 161
  symptoms of 161
  treatment of 163
Complications of anal fistula 75
  biopsy rectum 219
Complications of colostomy 250 251
  combined excision of rectum 246 251
  haemorrhoidectomy 146 149
  injection haemorrhoids 137 138
  restorative excision rectum 260-261
  sigmoidoscopy 39
  treatment anal fistula 101
Condylomata anal 283
Cordotomy 274
Corrugator cutis ani muscle 7
Crypts of Morgagni 2 3 4

DEEP POST ANAL ABSCESS clinical features of 60
  diagnosis of 61
  pathology of 57
  treatment of 66
Deep post anal space 12
Denonvilliers fascia 10 12 160
Diathermy endoscopic of benign tumours, 197
    complications of 197
    explosion in 197
    for multiple polyposis 199
Diet for colostomy patient 266
Disposable pouches for colostomy 263

ENDOMETRIOMA OF RECTUM 223
Endoscopic removal benign adenoma 197
  multiple polyposis 199
  villous papilloma 190
Enema pre-operative for carcinoma rectum 229
Epithelioma anal canal clinical features of 282
    differential diagnosis of 282
    incidence of 277
    pathology of 278
    spread of 279 282
    treatment of 285
  anus clinical features of 287
    differential diagnosis of 282
    incidence of 277
    pathology of 277
    spread of 279 282
    treatment of 282
Examination ano rectal anaesthetic for 41
    biopsy in 41
    couch for 26
    inspection in 30 31
    palpation in 31
    proctoscopy in 32
    radiology in 41
    sigmoidoscopy in 35
    in benign adenoma rectum 196
    in carcinoma rectum 218
    in fissure 118
    in fistula 76 79
    in haemorrhoids 133
    in prolapse rectum 162
    in pruritus ani 175
    in villous tumour 189
    record sheet for 29
Explosion in endoscopic diathermy 197

FAECAL FISTULA FOLLOWING RESTORATIVE RESECTION 261
Faeces impacted 25 149
Familial intestinal polyposis 197
  aetiology of 198
  and carcinoma 204
  clinical features of 198
  diagnosis of 198
  pathology of 198
  treatment of 199
Fascia anal intermuscular septum 7
  anal sphincter 94
  Denonvilliers 10 12 160 236 243
  lamina terminalis 12
  pelvic 164 166 237
  perianal 5 11 12
  of Waldeyer 241 248
Fascial supports of rectum 160
Fibrous polyp of anal canal 199
  clinical features of 201
  pathology of 200
  treatment of 202
Fissure anal 114
    aetiology of 114 148
    association with haemorrhoids 150
    clinical features of 117 118
    complications of 116 117
    differential diagnosis in 119 283
    incidence of 117
    pathology of 115
    pseudo polyp in 116
    treatment of 120
Fistula anal 68
    aetiology of 70
    anaesthesia in 50 51
    ano rectal ring in 82 83
    atypical 71
    carcinoma in 75
    complications of 75
    complications of treatment in 101
    definition of 68
    differential diagnosis in 79
    fissure and 72 117
    Goodsall s rule in 79
    high 71
    history of 68
    importance of ano rectal ring in 83
    internal haemorrhoids and 150
    isch o rectal 73
    low 71
    management of wound 83
    palpation of 31
    palpation of internal opening 31
    pathology of 70
    perianal 71
    physical signs in 76
    primary skin graft in 48 66 84 88
    primary suture in 46 83
    principles of treatment of 82
    pruritus ani in 24 172
    radiology in 79
    recurrent abscess in 75
    second intention healing of 45 83
    secondary skin graft in 88
    sigmoidoscopy in 79
    submucous 74
Fistula anal—*cont*
    symptoms of 24 76
    treatment of 81
    tuberculosis and 70 81
    wounds 47-49
  ischio rectal anal 73
    treatment of 90
  perianal anal 71
    treatment of 81
  rectal 75
    treatment of 101
  rectovaginal 220
    malignant 278
  submucous 74
    treatment of 100
  urethral 80 247
  urinary involving bladder 247
      membranous urethra 247
      ureter 247
Fistula in ano 68
Fistulette 72
Focal carcinoma 262

GEROTA S NODES 214
Gonococcal proctitis 186
Goodsall s ligature 157
  operation for fissure 122
Glands apocrine 111
Granular proctitis 180
Granulation tissue and fistula 83
Granuloma amoebic 223
Groove anal 3

HAEMATOMA anal 151
    clinical features of 23 151
  perianal 151 219
    clinical features of 23 151
  submucous 151
Haematuria following injection of haemorrhoids 137
Haemorrhage following excision rectum 247
    haemorrhoidectomy 146
    injection of haemorrhoids 137
Haemorrhoidectomy 138
  anal stenosis after 114 148
  complications of 114 146
  discharge from hospital after 145
  local anaesthesia for 149
  post operative treatment of 145
  pre operative treatment of 138
  secondary haemorrhage following 146
  selection of patients for 138
  technique of 139
Haemorrhoids external 127 151
  history of 127
  injection of 134
    complications of 137
    first degree 134
    post injection treatment 137
    second degree 134
    selection of cases for 134
    solution for 135
    syringe for 135
    technique 136
    third degree 135

Haemorrhoids—*cont*
internal 129 150
anatomy of 129 131
associated with fissure 114 150
fistula 150
definition of 127
first degree 131
injection treatment for 134
inspection of 133
operative treatment for 138
pathology of 131
physical signs in 133
pregnancy and 134 150
primary 129
proctoscopy in 133
prolapse of 24 130
second degree 131
secondary 129
sigmoidoscopy in 133
symptoms of 132
third degree 132
treatment of 126 134
Workers Compensation Act and 150
thrombosed 23 131 133 151
diagnosis of 285
treatment of 150
Hartmann s operation 268
Hernia colostomy 251
perineal 251
Hilton s white line 3
Hidradenitis chronic suppurative 111
aetiology of 111
conservative treatment of 112
diagnosis of 79 111
pathology of 111
surgical treatment of 112
Historical appendix 287
Arderne John 287
Denonvilliers Charles 287
Gerota D 288
Hilton John 288
Houston John 288
Mikulicz 289
Miles W E 292
Morgagni John 289
Proust P 290
Thiersch K 290
Waldeyer Hartz H 290
Houston s valves 7 8 32 37 39
Hysterectomy 252

ILEO-RECTAL ANASTOMOSIS IN MULTIPLE POLYPOSIS 199
Impacted faeces 25 149
Incidence carcinoma rectum 202
Incontinence associated with rectal prolapse 161
following operation for rectal prolapse 171
restorative resection 261
sphincter damage 101
repair of sphincter for 103
Infection of abdominal wound 251
haemorrhoidectomy wound 147
perineal wound 251
urinary tract 248
Inferior haemorrhoidal vessels 15
Injection ulcer 137
Internal sphincter muscle 6
Invasive carcinoma 262
Irrigation rectal stump 257
Ischio rectal abscess clinical features of 58-60
diagnosis of 61
fistula following 66
pathology of 57
treatment of 66
Ischio-rectal anal fistula 73
ano rectal ring in 78 91
blood loss in operation for 91
diagnosis of 79
duration hospital stay 92
extensions of 91
external opening 73
fistulous track 74
injury to rectum in treatment of 91
internal opening 73
length of operation for 92
operative technique for 94
palpation of track in 77
post-operative treatment of 95
pre-operative treatment of 93
preparation of wound for skin graft 94
principles of treatment of 90
probing of 78
prolapse of rectum following treatment of 155
skin grafting in 95
staged operation for 102
Ischio rectal fossa 11 56 73
Ischio rectal space 11 56 73

JAUNDICE COMPLICATING INJECTION OF HAEMORRHOIDS 138

LAMINA TERMINALIS 12
Large bowel obstruction 220
Lateral space obstruction 23[illegible] [illegible]49
Leukoplakia perianal 174
Levator ani muscle 9
Ligaments lateral of rectum 14 160
in removal of rectum 237 244
Lithotomy Trendelenburg position 227 231
Liver metastasis survival with 216 225
Longitudinal muscle 6 129
Lymph glands enlargement in carcinoma 2[illegible]5
Gerota s 17 214
inguinal 19 214 279
removal of 285
middle haemorrhoidal 214 [illegible]8
metastasis in epithelioma 285
para rectal 214
superior haemorrhoidal 17 212 [illegible]9
Lymphatic drainage anal canal and rectum 16-19
Lubrication for examination 27

MALIGNANT MELANOMA 285
Melanosis coli colour of adenoma in 19[illegible]
Mercuric perchloride irrigations [illegible]
Metastases peritoneal prognosis 21[illegible] 2[illegible]0
Miles operation 2[illegible]6
Milligan s triangle of exposure 140

Morgagni columns of 2
  crypts of 2 3
Mucosa anal canal 2 34 129 133
Muscle corrugator cutis ani 7 11
  deep external sphincter 5 12 31
  external sphincter 4
  ileo-coccygeus 9 241
  internal sphincter 6 11 31 142
  levator ani 9 31
    weakness of in prolapse 161
  longitudinal 6 129
  Luschka s 6
  muscularis mucosae 7 11 115 142
    in anal fissure 115
  pubo-coccygeus 9 158 241
    repair in prolapse 167
  pubo rectalis 10 12 158 241
    repair in prolapse 166
  recto urethralis 10 12
  subcutaneous external sphincter 5
  superficial external sphincter 5
  transversus perinei 90 94
  sphincter effect of division 101
    function in relation to fissure 115

NERVES anterior sphincteric 20
  coccygeal 20
  inferior haemorrhoidal 19
  parasympathetic 19
  perineal branch of sacral nerve 19
  sympathetic 19
Nerve injury pelvic 248 249
Nodes Gerota s 17 214
Novocaine injection for fissure 121

OBSTRUCTION intestinal following excision rectum 249
Oleogranuloma 223
Osteomyelitis ischium 80
Ovarian secondary malignant tumour 216

PAIN following injection haemorrhoids 137
  in carcinoma rectum 218
  with recurrent carcinoma in perineum 271
Papillae anal 3
Papilloma malignant 205
Partial prolapse rectum 154 155
Pecten 3
Pectinate line 3
Pelvic aperture 10 158
Pelvic floor in prolapse rectum 160 166
Pelvi rectal abscess 58
Perchloride of mercury 255
  irrigation of rectum 256 257
Perianal abscess 56
  advantage one stage operation in 63
    two stage operation in 66
  clinical features of 58
  diagnosis of 61
  disadvantages one stage operation in 63
    two stage operation in 66
  one stage operation for 62
  pathology of 56
  treatment of 62
  two stage operation for 64
Perianal fascia 5 11 12

Perianal fistula 71
  atypical blind 72
    complicated 71
    high 72
    subcutaneous 72
  complicating anal fissure 117
    haemorrhoidectomy 147
  curved 71
  delayed primary skin graft in 90
  differential diagnosis of 79
  disadvantages second intention healing 88
  operative treatment of 85
  palpation of track in 76
  post operative treatment of 85
  pre operative treatment of 84
  primary skin graft for 88
  probing in 78
  relation to sphincter muscle 71
  second intention healing of 85
Perianal haematoma 23 24 151
  post-operative 153
  recurrent 153
  treatment of 152
Perianal pilonidal sinus 110
  diagnosis from fistula 80
Perianal space 10 56
Perineal hernia 251
Perineal recurrent carcinoma treatment of 273
Perineal wound management of after excision rectum 245
Pilonidal sinus 104
  aetiology of 104
  clinical features of 105
  pathology of 105
  perianal 80 110
  post operative treatment of 109
  primary closure after excision 107
  sex distribution 105
  skin graft after excision 107 108
  treatment of 107
Phenol 127 135 158
Phenol and calamine lotion 176
Polyp benign rectal 191
  fibrous of anal canal 199
  malignant rectal 261
Polyposis multiple 197
Prefrontal leucotomy 275
Pregnancy internal haemorrhoids in 150
Primary skin graft anal fistula 84
  recurrent fistula with 101
Primary suture fistula wound 83
Probe and anal fistula 78
  and pilonidal sinus 106
Proctalgia fugax 23
Proctitis aetiology of 180
  age incidence 182
  antibiotics as cause of 185
  artefacta 185
  clinical features of 182
  diagnosis of 184
  granular 180
  injection of haemorrhoids as cause of 138
  non specific 180
  prognosis in 180
  relation to proctocolitis 180

Proctitis—*cont*
sex incidence of 182
sigmoidoscopic appearance in 180
suppository 185
venereal 186
Proctocaine 121
Proctocolectomy for multiple polyposis 199
Proctocolitis diagnosis from proctitis 184
relation to proctitis 180
Proctoscope 32 34
Proctoscopy 32 34
in carcinoma of rectum 219
in internal haemorrhoids 133
in prolapse of rectum 163
in villous tumour 189
Prolapse colostomy 250
Prolapse rectum anterior wall 159
diagnosis of 163
symptoms of 161
treatment of 171
complete 24 103 158
abdomino perineal repair of 165
aetiology of 160
diagnosis of 157 163
pathology of 158
post operative treatment of 170
pre operative treatment of 167
recurrence of 171
sex incidence of 160
signs of 162
symptoms of 161
strangulation of 161
technique of operation for 168
treatment of 163
partial 155
aetiology of 155
diagnosis of 157
pathology of 155
signs of 157
symptoms of 156
treatment of 157
Pruritis ani 24 172
acute 174
chronic 174
diagnosis from epithelioma 283
excision of skin in 46 177
internal haemorrhoids and 133
pathology of 173
psychiatry and 175
signs in 175
symptoms of 174
Pruritis ani treatment of 175
Pseudopolyps ulcerative colitis and 199
Psychiatric treatment of proctitis 186
pruritis ani 175

RADIOLOGY IN ANO-RECTAL INVESTIGATION 39
anal fistula 7[illegible]
carcinoma rectum 219
proctocolitis 184
Radiotherapy in epithelioma of anus [illegible]85
Reactionary haemorrhage after excision rectum 247
haemorrhoidectomy 14[illegible]
Rectal adenoma 191
clinical features of 194
Rectal adenoma—*cont*
diagnosis of 196 222
pathology of 192
signs of 195
symptoms of 194
treatment of 196
Rectal fistula 75
diagnosis of 81
treatment of 101
polyp malignant 261
sensation 20
Rectogenital septum 12
Recto sigmoid junction 7 8 38 39
Recto-urethralis muscle 10 12
Rectovaginal fistula 2[illegible]0
Rectum anatomy of 7 9
carcinoma of abdomino perineal excision of 225
aetiology of 202
in relation to multiple polyposis 198 204
in relation to benign tumour 20[illegible]
age incidence of 217
cachexia in 221
complications of abdomino perineal excision of 246
complications of restorative excision of 260
construction of colostomy for 238 259
contraindications to excision of 224
diagnosis of 189 196 221 284
examination in 218
excision with bladder 253
with previous colostomy 252
excision with seminal vesicles 25[illegible]
uterus 252
vagina 252
Hartmann's operation for 268
history of abdomino perineal excision for 226
history of restorative resection for [illegible]54
incidence of 202
large bowel obstruction in [illegible]
local spread in 211
lymphatic spread in 212
malignant rectal polyp and 261
metastases from 215
mode of presentation of 218
palliative colostomy for 225
excision for 225
pathology of 205
perforation complicating 2[illegible]0
peritoneal invasion in 216
peritoneal reflection and prognosis of 232
post-operative treatment after abdomino-perineal excision 244
post operative treatment after restorative excision 260
prognosis of [illegible]
prognostic significance of local invasion in [illegible]
lymphatic spread in [illegible]14
macroscopic appearance in 208
microscopic appearance in [illegible]
peritoneal invasion in [illegible]
venous spread in [illegible]

Rectum carcinoma of—*cont*
radical excision of 225
restorative excision of 253
recurrence post operatively 257 271
results of treatment 268
sex incidence 217
signs of 218
symptoms of 218
technique of abdomino perineal excision of 231
restorative excision of 256
treatment of 223
venous spread in 215
complete prolapse of 158
abdomino perineal repair of 165
aetiology of 160
diagnosis of 163 185
history of treatment of 163
pathology of 160
post operative treatment of 170
pre operative treatment of 167
recurrence of 171
sphincter function after repair of 171
symptoms of 161
technique of operation in female 167
male 170
treatment of 163
injury of during operation for fistula 91 94
partial prolapse of 154
aetiology of 155
diagnosis in 157
signs of 157
symptoms of 156
treatment of 157
prolapse of 154
anterior wall of 159
villous tumour of 187
diagnosis of 189
pathology of 187
signs of 189
symptoms of 189
treatment of 190
Recurrence carcinoma rectum local after restorative excision 255
nature of 271
perineal after abdomino perineal excision 271
Restorative resection for carcinoma rectum 253
complications of 260
history of 254
post operative treatment for 260
pre operative treatment for 255
recurrence after 255
selection of cases for 254
technique of 256
trans anal anastomosis 255
Retention of urine after excision rectum 245 248
Rodent ulcer anus 285

SACRAL INFILTRATION IN RECURRENT CARCINOMA 273
Second intention healing anal wounds 45
Secondary haemorrhage after haemorrhoidectomy 146
incidence of 147
treatment of 146
Seminal vesicles excision of with rectum 252
Sensation colonic 20
rectal 20
Sessile adenoma of rectum 192
Sexual function after excision rectum 249
Shock after excision rectum 246
Sigmoid colon developmental adhesions related to 233
Sigmoidoscope 35
Sigmoidoscopy 35-41
benign adenomas and 196
cancer rectum and 219
complications of 39 41
internal haemorrhoids and 133
preparation for 37
proctitis and 180
Sigmoidoscopy technique of 37
Sinus perineal 104
perianal pilonidal 110
pilonidal 104
Skin graft anal fissure and 124
anal fistula and 88 94
anal stenosis and 148
chronic suppurative hidradenitis and 112
dental chip syringe in 88
first dressing in 89 100
instruments for 95
perianal pilonidal sinus and 116
pilonidal sinus and 108
pruritus ani and 177
secondary 88
technique of 88
Space deep post anal 12 57 74 241
ischio rectal 11 56 73
perianal 10 56
posterior subsphincteric 57
retroprostatic of Proust 12
submucous 10 58
Sphincter function after abdomino anal anastomosis 268
anterior resection 261
Sphincter injury after prolapse of rectum 103 155
Sphincter preservation carcinoma of rectum and 253
Spine lesions prolapse of rectum in 161
Spinothalamic tract 275
Stenosis anal causing fissure 114
following haemorrhoidectomy 148
treatment of 148
Stenosis colostomy cause of 250
treatment of 250
Stirrups Lloyd Davies 94 227
Stricture rectum benign 223
following restorative resection 261
Subcutaneous anal fistula 72
Subcutaneous colostomy 264 265
Submucous abscess 58
clinical features of 60 61
diagnosis of 61
pathology of 58
treatment of 66

Submucous anal fistula 74
diagnosis of 81
palpation of 78
primary type 74
secondary type 75
technique of operation in 100
treatment of 100
Submucous space 10 58
Succinylsulphathiazole 66 85 122 138 177 229
Sudeck s critical point 14 15
Superior haemorrhoidal vein 16 129
Suppuration ano rectal 55
pilonidal 105 107
relation to fissure 117
*Suppurative hidradenitis chronic* 111
diagnosis from fistula 79
Synchronous combined excision rectum 226
repair prolapse rectum 166
Syphilis anal 119
Syphilitic proctitis *186*

THREADWORM INFESTATION 24 176
Tubercle of Hippocrates 68
Tuberculous anal fistula 70 79 81

ULCER anus non specific 283
tuberculous 283
Ulcerative colitis carcinoma of rectum complicating 204
proctocolectomy for 253
Unsatisfactory defaecation 25
Unsatisfied defaecation 25
in anterior wall prolapse rectum 161
in carcinoma rectum 218
in haemorrhoids 133
in proctitis 184
in prolapse rectum 159
in villous papilloma 189
Ureter dissection of in carcinoma rectum 234
fistula involving 247
injury to in excision rectum 235

Urethra fistula involving 80 247
Urinary fistula after excision rectum 247
Urinary infection after excision rectum, 248
Urinary retention after excision rectum 248
Urological symptoms in carcinoma rectum 220

VAGINA excision of posterior wall of 252
invasion of by carcinoma rectum 217
Valves anal 2
of Houston 7 8 32, 37 39
Vascular pattern of rectal mucosa 8
Vein inferior mesenteric 16 234
superior haemorrhoidal 16 129
Villous papilloma 187
abdominal removal of 190
diagnosis of 189
malignant change in 205
pathology of 187
signs of 189
*symptoms of 189*
trans anal removal of 198
treatment of 190

WALDEYER fascia of 241 248
*Wangensteen s second look operation* 273
Workers Compensation Act and internal haemorrhoids 150
Wounds anal contamination of 42
delayed primary skin graft of 49
*first intention healing of 46*
fistula formation complicating 43
immobilisation of 43
inaccessibility of 43
primary skin graft for 48-49
*second intention healing of 45*
secondary skin grafting of 88
size of 43
Wound disruption after excision rectum 251

X RAY diagnostic in carcinoma rectum 219
proctitis 184
therapy for perineal recurrence 273
Xylocaine 119 120 176 273